THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVII. No. 1713.] LONDON, MARCH 10, 1896. [48TH YEAR. PRICE 6d.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

Lanemark Coal Co., LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on Application to
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Shipping Ports: All the principal Scotch Ports.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT, Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.
WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

"BEAR CREEK" CANNEL.
LOG MOUNTAIN COAL, COKE, AND TIMBER CO.
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Cable Address: "Hull, Pineville."
LONDON AGENTS:
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"ABYSSINIAN" & ARTESIAN TUBE WELLS,
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

THE MELDRUM FURNACE FOR DUST-FUEL.

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SPECIALLY USEFUL FOR GAS-WORKS.

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16, UNION COURT, LONDON;
5, EAST PARADE, LEEDS;
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(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

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PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

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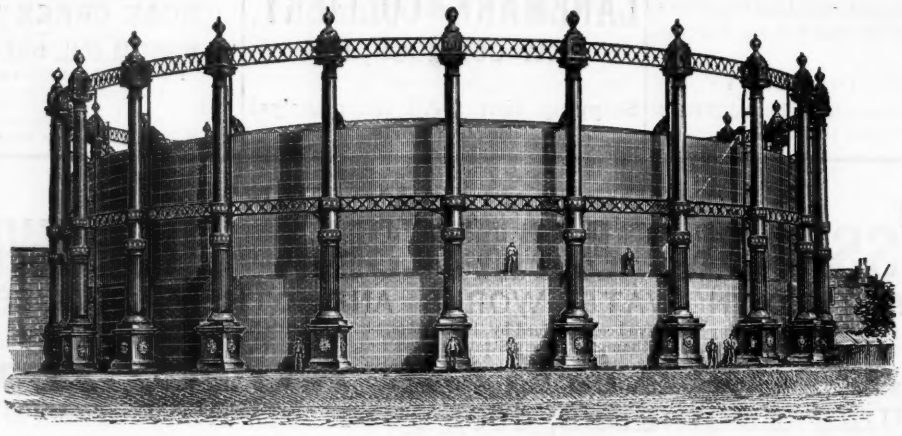

Manufacturers of PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, Weighbridges, COKE BREAKERS.

MAKERS OF FISH & SMITH'S PATENT (NO. 5108) OVERFLOWS FOR REGULATING THE SEAL IN GAS-WASHERS, &c., AND COCKEY & SMITH'S PATENT SELF-ACTING BYE-PASS VALVES.

Estimates for any description of Gas Plant on application.

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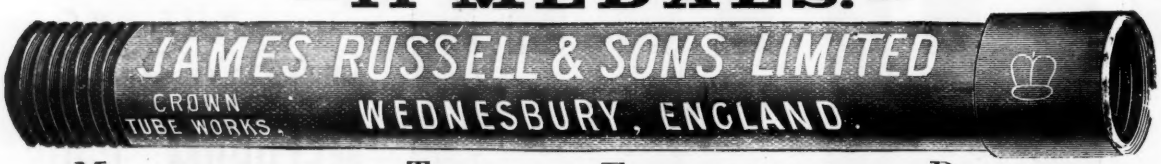

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WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

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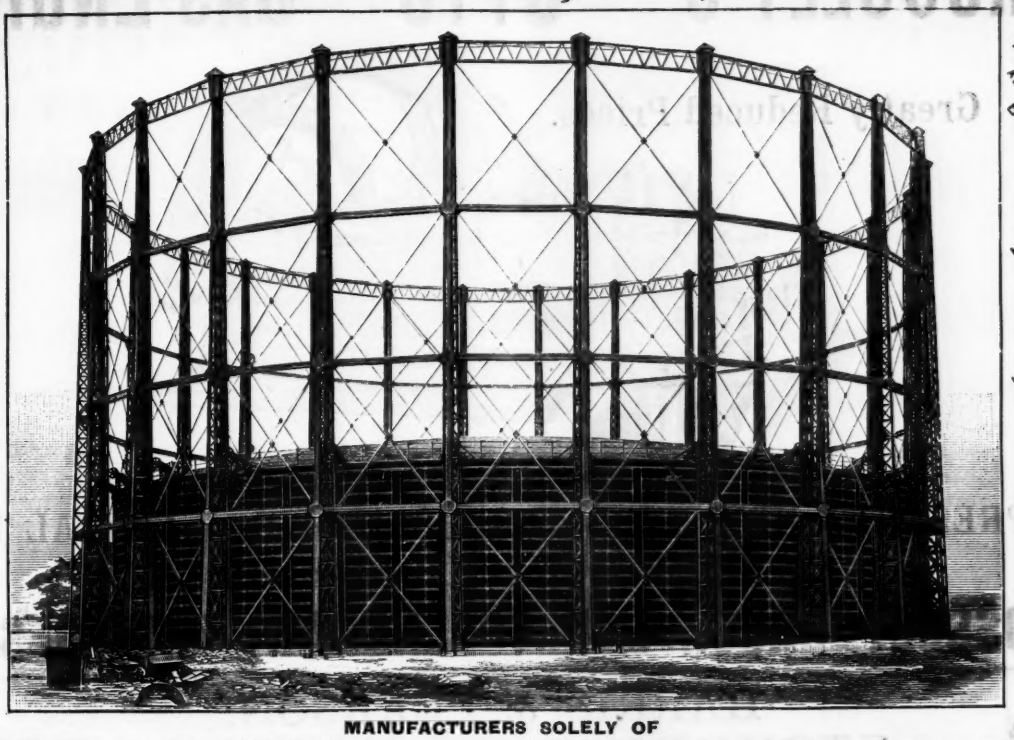

TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM

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— HAS ALREADY BEEN SUPPLIED TO GAS-WORKS AT —

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Inquiries to be sent to the Patentees: 9, VICTORIA STREET, LONDON, S.W.

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Address THE STRAFFORD COLLIERIES COMPANY,

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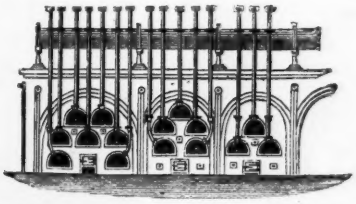

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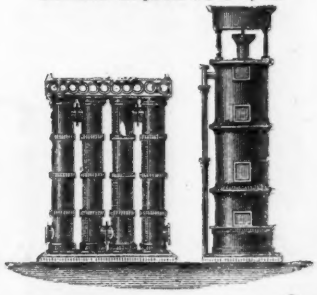
TAR AND LIQUOR PUMPS, &c.



PATENT

CENTRE-VALVES

for working Purifiers,

Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS, and SPECIALS.

WOOD GRIDS.

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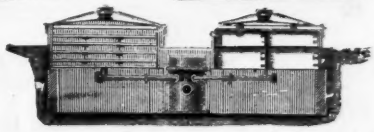

DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINES

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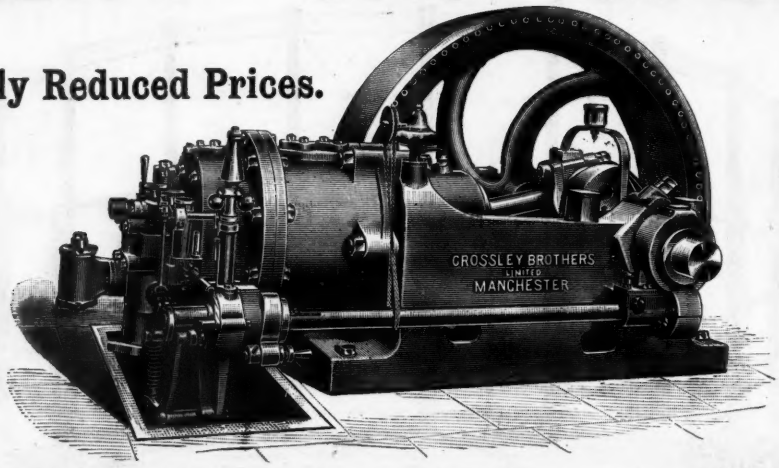

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FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

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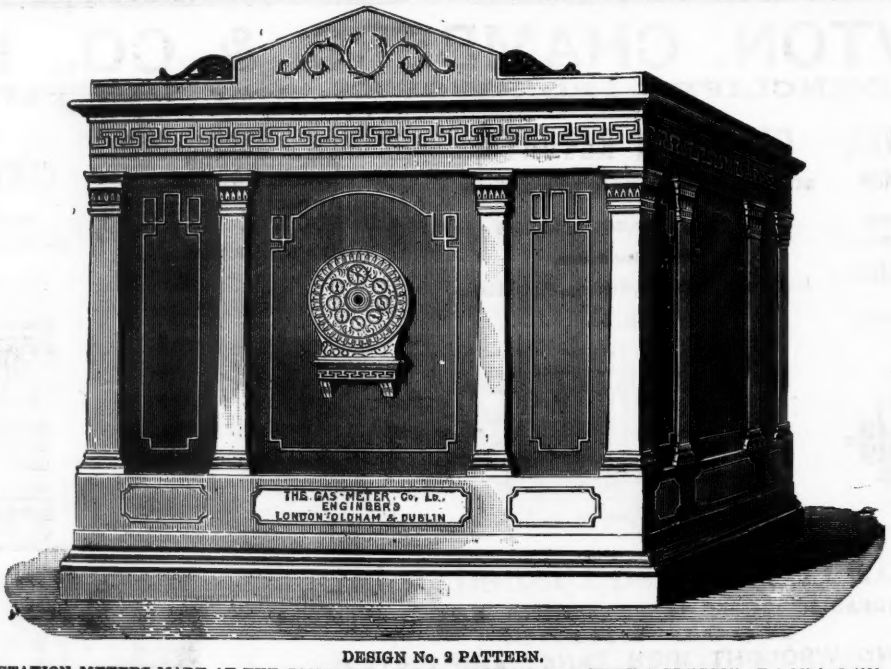
SQUARE STATION METERS WITH PLANED JOINTS.



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DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, LATE WEST & GREGSON. Established 1830.

For Prices and Particulars apply to

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Works: 238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

Telegraphic Address: "METER."

[See Advertisement on back of Wrapper.

INCANDESCENT GAS-LIGHT

(Welsbach Patents).

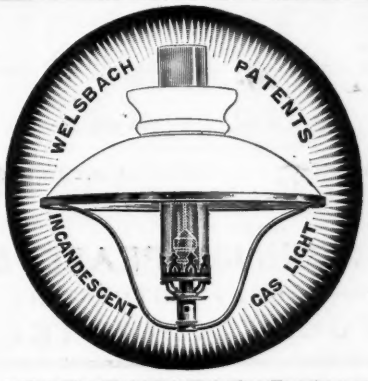
Further Great Reduction in Prices,

FROM MARCH 2, 1896,

Due to Colossal Sales,

Places this highly popular Light within the means of all classes.

The greatly Reduced Consumption of Gas COVERS THE INITIAL COST OF THE BURNERS IN FROM SIX TO EIGHT MONTHS.



The PRICES have been REDUCED as follows:—

The Ordinary "C" Burner to 6s. 6d.

The "C" Bye-Pass Burner to 7s. 6d.

Prices of other Patterns reduced proportionately.

SPECIAL ATTENTION IS CALLED TO THE

"S" BYE-PASS BURNER, PRICE 7s. 6d.

Which, with a Consumption of 2¼ Cubic Feet of Gas an hour, gives a light of 25 to 30 Candle Power.

This Pattern is particularly recommended where it is desired to effect a large saving in Gas rather than to effect a great increase in the Light.

The attention of Gas Managers and Gas Engineers is called to this System of Lighting as one which tends to Popularize the use of Gas as an Illuminant, owing to the following Advantages—

ECONOMY IN CONSUMPTION OF GAS, COMBINED WITH HIGH ILLUMINATING EFFICIENCY.

FREEDOM FROM SMOKE, DIRT, AND FLICKERING.

GREATLY REDUCED HEAT.

The *Lancet* Special Analytical and Sanitary Commission, in an exhaustive report, pronounces the Incandescent Gas-Light System to be the Healthiest, Best, and most Economical System of Gas Lighting.

SUITABLE FOR EVERY PURPOSE OF INSIDE OR OUTSIDE LIGHTING.

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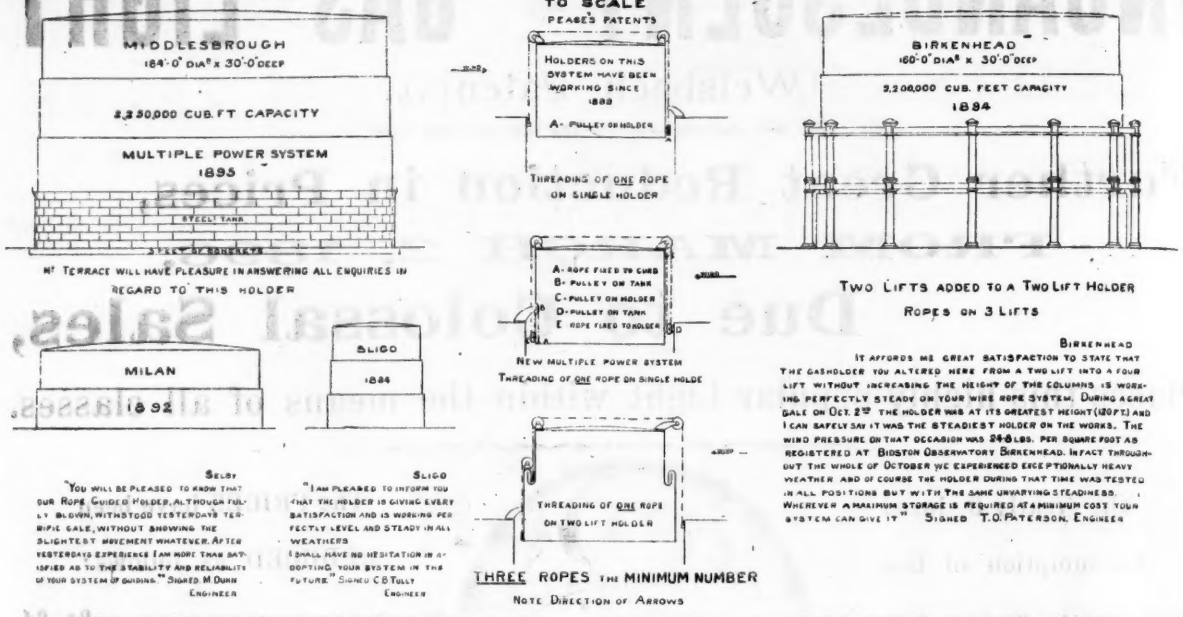
Palmer Street, Westminster, London, S.W.

DIAGRAMS ILLUSTRATING REPRESENTATIVE
ROPE GASHOLDERS

TO SCALE
PEASE'S PATENTS



Mr TERRACE WILL HAVE PLEASURE IN ANSWERING ALL ENQUIRIES IN REGARD TO THIS HOLDER

SELBY

"YOU WILL BE PLEASED TO KNOW THAT OUR ROPE GUIDED HOLDER, ALTHOUGH FULLY BLOWN, WITHSTOOD YESTERDAYS TERRIFIC GALE, WITHOUT SHOWING THE SLIGHTEST MOVEMENT WHATEVER. AFTER YESTERDAYS EXPERIENCE I AM MORE THAN SATISFIED AS TO THE STABILITY AND RELIABILITY OF YOUR SYSTEM OF GUIDING." SIGNED M. DUNN ENGINEER

SLIGO

"I AM PLEASED TO INFORM YOU THAT THE HOLDER IS GIVING EVERY SATISFACTION AND IS WORKING PERFECTLY LEVEL AND STEADY IN ALL WEATHERS. I SHALL HAVE NO HESITATION IN ADOPTING YOUR SYSTEM IN THE FUTURE." SIGNED C.B TULLY ENGINEER

BIRKENHEAD

IT AFFORDS ME GREAT SATISFACTION TO STATE THAT THE GASHOLDER YOU ALTERED HERE FROM A TWO LIFT INTO A FOUR LIFT WITHOUT INCREASING THE HEIGHT OF THE COLUMNS IS WORKING PERFECTLY STEADY ON YOUR WIRE ROPE SYSTEM. DURING A GREAT GALE ON OCT. 2ND THE HOLDER WAS AT ITS GREATEST HEIGHT (120FT.) AND I CAN SAFELY SAY IT WAS THE STEADIEST HOLDER ON THE WORKS. THE WIND PRESSURE ON THAT OCCASION WAS 24·8 LBS. PER SQUARE FOOT AS REGISTERED AT BIDSTON OBSERVATORY BIRKENHEAD. IN FACT THROUGHOUT THE WHOLE OF OCTOBER WE EXPERIENCED EXCEPTIONALLY HEAVY WEATHER AND OF COURSE THE HOLDER DURING THAT TIME WAS TESTED IN ALL POSITIONS BUT WITH THE SAME UNVARYING STEADINESS. WHEREVER A MAXIMUM STORAGE IS REQUIRED AT A MINIMUM COST YOUR SYSTEM CAN GIVE IT" SIGNED T.O. PATERSON, ENGINEER

THESE HOLDERS ARE CONSPICUOUS FOR STEADY AND LEVEL WORKING UNDER ALL CONDITIONS, THEY WORK WITH MUCH LESS FRICTION AND IRREGULARITY IN A GALE OF WIND THAN GASHOLDERS WITH COLUMNS, AND ARE ALWAYS STEADY.

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GAS WORKS CONTRACTORS
STOCKTON-ON-TEES

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Improvements in Sulphate of Ammonia Apparatus

(COLSON'S PATENT)

EXTRACT FROM ENGINEER'S REPORT—

"I can now obtain 60 Tons of Sulphate of Ammonia per week with 'Colson's' Still, using ONE Boiler, whereas, with my former continuous plant, TWO Boilers were required to produce 40 Tons per week."

For Prices and Particulars, apply to the Sole Makers—

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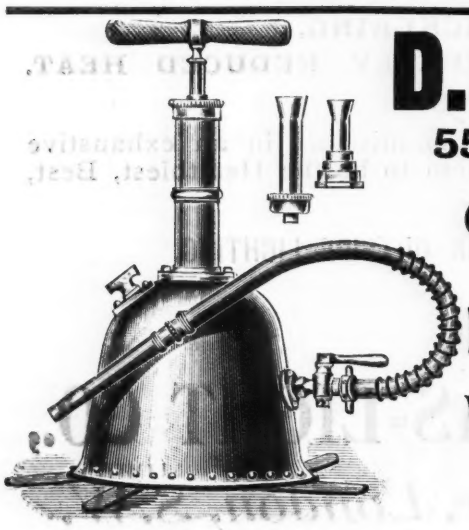

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GAS SERVICE CLEANSERS.
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DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES & FITTINGS.
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PRICE LISTS ON APPLICATION

ECONOMY IN PURIFICATION.

INCREASE the EFFICIENCY of your Purifiers by adopting

CRIPPS'S PATENT BYE-PASS VALVE

IN THE LOWER TIERS OF SIEVES.

Practical Experience proves its Economy.
Engineers are repeating orders after thorough trial.

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LARGEST GASHOLDER IN THE WORLD
ALSO THE LARGEST METAL TANK IN THE WORLD
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Ballymena	Cranbrook
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Bideford	Downpatrick
Birmingham	Dursley
Blackburn	East Ardsley
Bognor	Eastbourne
Bollington	Elland
Boreham	Ellesmere
Bramham	Elstree
Brandon	Eye
Bridgnorth	Farnham
Broadgreen	Felixstowe
Broadstairs	Garston
Bromsgrove	Gillingham
Broughty Ferry	Gorey
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Contractors to Her Majesty's Government, the Indian Government, the Natal Government, the Turkish Government, the Netherlands Railway, the London County Council, &c., &c.

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Guaranteed genuine and free from adulteration, and specially made to withstand Gaseous Fumes.

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Knutsford	Skibbereen
Leamington	Slough
Ledbury	Southam
Leek	Southend
Leven, N.B.	Stafford
Limerick	Stamford
London	Strood
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Lymington	Swinton
Merthyr Tydfil	Sudbury
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Outlane	Uppingham
Pembroke	Uttoxeter
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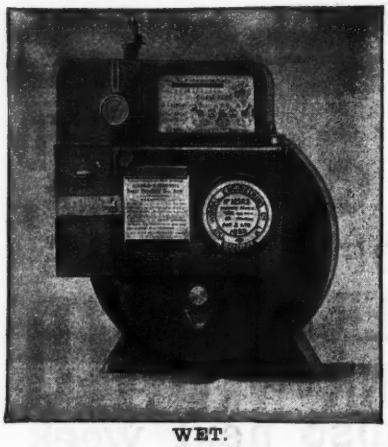

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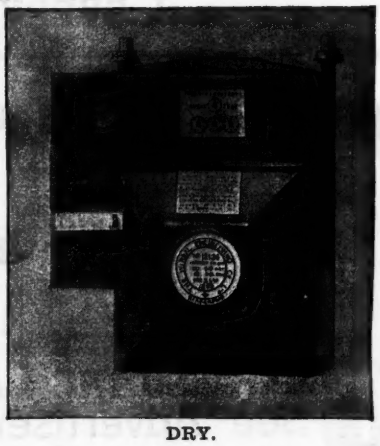
THE "PERFECT" AUTOMATIC.

Simple! Positive!! Accurate!!!

The only Prepayment Meter with no Springs, Counter-Balance Weights, or Frictional Gearing to get out of order.



DRY.

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Established 1790.

MANUFACTURERS OF EVERY DESCRIPTION OF GAS PLANT,

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FOR WHICH THEY HAVE THE NEWEST AND MOST MODERN MACHINERY.

GASHOLDERS CAN BE MADE OF ANY DIAMETER AND PUT TOGETHER AT THE WORKS.

Holders having a capacity of **8,000,000** Cubic Feet have been made and erected; the largest one being 181 feet diameter by 136 feet 9 inches deep. Riveted entirely with ⅞-inch diameter Hot Rivets.

WE ERECT GASHOLDERS EITHER WITH OR WITHOUT FRAMING.

NO ROYALTIES TO PAY FOR PATENTS.

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Which has been approved and adopted by the Gas Authorities at

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Prices, &c., on application to the above.

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MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching

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CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital, Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas for the Enrichment of Gas.

FOR PRICES AND FULL PARTICULARS, APPLY TO

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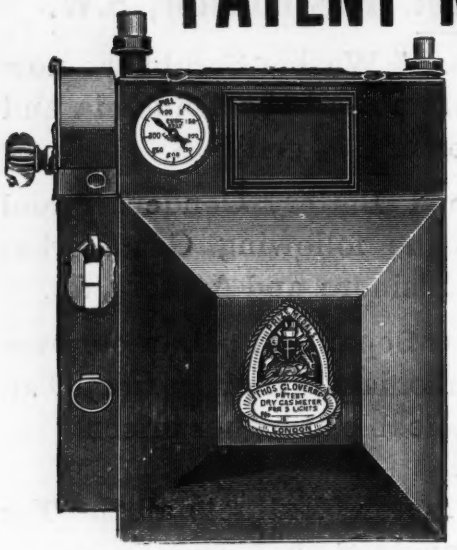
THOMAS GLOVER & CO.'S
PATENT NEW IMPROVED
PREPAYMENT METER



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Simple in Mechanism.
Positive in Results.
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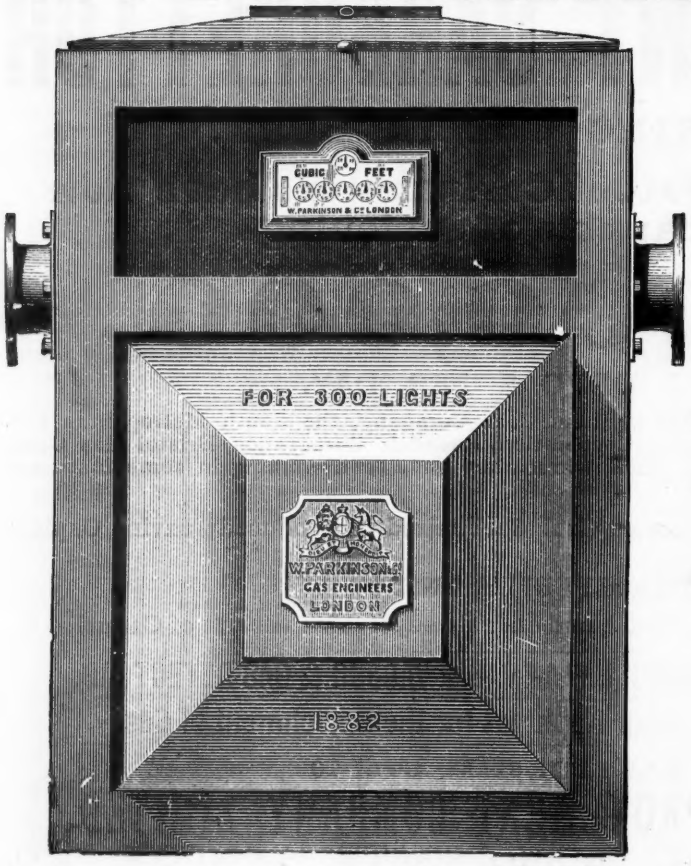

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[See also Advt., p. 544.

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EDITORIAL NOTES.

The Purchase of their Houses by Workmen.

AN interesting debate occupied the House of Commons last Wednesday, upon Sir A. Hickman's motion for the second reading of the Working Men's Dwellings Bill, which was eventually carried, despite the opposition of the party with which Mr. John Burns is associated, by a majority of 185. The Bill was to have been referred to a Select Committee, with the object of being put into workable shape. But this was prevented; and it is consequently impossible to say at present what may become of it. The measure is practically the same as that for which Mr. T. Wrightson, formerly member for Stockton, was responsible; and its main provisions have on former occasions been discussed, and (with some reservations) approved of, in these columns. The gist of the proposal is that small householders of the working class, including clerks and others of similar social standing whose earnings do not exceed an average of £3 per week, should be assisted in purchasing their houses, if they so desire, by the local authority. On the face of it, there would not appear to be anything very terrible about such a proposition. We have regarded it favourably, not as an isolated project, but as one of a class of suggestions aimed at the desirable object of assisting the thrifty among that extensive order of the community by whom help in forming the habit of saving, and taking care of their savings, is most likely to be fully appreciated. The facilitating of small investments in corporation and gas stocks is another of the same class of ameliorations of the position to which the frequent failure of building societies has condemned the thrifty artisan—of not knowing what to do with his savings. Unfortunately, those self-appointed spokesmen of the working class who, like Mr. John Burns, see no good in anything but Communism, have a rooted objection to everything that tends to make into "capitalists" those for whom they presume to speak. Thus, to help those who have begun in a small way to help themselves is, in the eyes of these demagogues, an iniquity. Mr. Burns's remarks in the course of Wednesday's debate are instructive as indicating the aversion with which politicians of his stamp regard every proposal to consolidate the interest of the wage-earner with anything else than his Trade Union, and, of course, his professional "leader." According to these scarcely disinterested views, the working man must not have a share in the profits of the enterprise in which he is employed; he must not be encouraged to become the owner of his house; he must be kept an unattached, floating unit of a town population, in which condition he is naturally most likely to be susceptible of "agitation."

A reasonable objection to the particular measure under notice is that, at any rate to begin with, only a small proportion of those whom it is designed to benefit are in a position to take advantage of it. From another point of view, however, this is an excellent reason for trying what the effect of such a measure would be. Mr. Flannery said with truth on Wednesday that workmen are not the shiftless, migratory creatures, destitute of the home-keeping instinct, that their detractors are apt to assume them to be. This presumption was the bugbear that for long frightened Gas Companies from putting gas-fittings and meters at their disposal. Now it has been learnt, by experience gained in many towns, that if the circumstances are made to fit him, and he is not left to fit himself to conditions unsuitable to his case, the small householder is, in point of fact, a very stable element in the community. With regard to the housing of workmen in residences of their own, which is in a sense the complementary arrangement to housing them in dwellings provided by their employers, it is quite easy to see that there must be many localities, and many conditions, which combine to prevent such a result being achieved. The case of tenement-dwellers, for whom the member for Battersea professes to be more specially concerned, cannot well be touched by the Bill under notice. But this is no reason why those who might be benefited by it, should be deprived of the advantage. The worst of the whole matter is that party politics have now become mixed up with it to an extent that renders difficult the task of those who would deal with the proposal upon its merits. The late member for Stockton, and father of the Bill, is justified in declaring,

as he does in a letter that appeared in "The Times" on Saturday, that the chief opposition to the measure comes from a Party which "recognizes the measure to be one that "would encourage independence amongst working men, "which" he fears "it is their object to prevent. It is a "well-known fact that, so soon as a working man has "become possessor of a property, however small, he no "longer wishes to share it with those who have none; "and he naturally becomes a defender instead of a "destroyer of the rights of property." The concluding observation goes farther than the immediate subject. We should like to see every ratepayer pecuniarily interested in the affairs of his own municipality, and every gas company truly a gas consumers' company.

The Cheltenham Corporation and the Gas Company.

THE subject of the opposition by the Cheltenham Corporation to the Gas Company's Bill, to which it was sought to give point by the promotion of a Corporation Bill to enable the undertaking to be acquired in the name of the ratepayers, was discussed at the last monthly meeting of the Town Council. Confession had to be made on this occasion that the "owners and occupiers" concerned in the proposed transaction had declined it; and it was also complained that the "JOURNAL," in commenting on this circumstance, had uttered an unkind truth in remarking that the poll would have the effect of taking the "stiffness" out of the opposition by the Corporation to the Company's Bill. Indeed, we seem from all accounts to have considerably stirred up some of the leaders of Cheltenham local politics; Alderman Norman in particular referring in an injured way to what he described as our "rejoicing" over "the defeat which the ratepayers had sustained—"for, after all, it was the interests of the ratepayers "that were concerned." In everything that has been advanced in these columns in regard to this Cheltenham business, our aim has been to set clearly before the readers of the "JOURNAL" generally, and not only those who happened to reside at Cheltenham, the rights and wrongs of what was going on with respect to this typical example. Here was a case of a Gas Company, against the past conduct of whom nothing could be rightly urged, going to Parliament for further capital powers and other facilities. The proper course for the Local Authority to follow in such an instance is to oppose the Bill of the Company, if it is found to contain proposals which there is reason to think might be made more advantageous to the public. Nobody is under any illusions in regard to a matter of this kind. The promoters of a Gas Bill have their own interest to consider first and foremost; and they consequently ask for enough—possibly for a little more than they expect to get eventually. We do not say the Cheltenham Gas Company have or have not done this; that is for Parliament to determine. But it would be childish to pretend ignorance of the usual way of doing business of this particular kind. At any rate, let it be put in this way: In most, if not all, projects of legislation, there are contained proposals which are vital, and others which are susceptible of alterations that may or may not be considered improvements, according to the point of view. When the Cheltenham Corporation became aware that the Gas Company intended to go to Parliament, they should, in the circumstances, have confined themselves to legitimate criticism, pointing to that regular and proper parliamentary opposition which nobody could deny their right to exercise in the public interest. Instead of doing this, or rather in addition to this, the Corporation rashly adventured upon a Purchase Bill, which, as it now appears, the town does not want. They have thus drawn upon themselves a gratuitous check, which must inevitably injure their prestige when they fall back upon their second line of action. This is what we meant by asserting that the "stiffness" would be taken out of the Corporation's opposition to the Company's Bill; and it may be contended that the opinion is justly formed. Looking at the Cheltenham incident for the sake of its general bearing—for, of course, we do not pretend to any local interest in the issue—its value consists in the evidence which it supplies as to the inexpediency of meeting a Gas Company's Bill by the promotion of a Corporation Bill for acquiring the undertaking, in the absence of a good case for municipalization. It would be a scandalous waste of public money if every gas company's Money Bill were to be treated in this fashion. Local authorities often seem to require reminding that the need of a statutory company for further capital to develop their undertaking is not accepted by the Legislature as sufficient reason for dispossessing the proprietors of their investment. Indeed, the need for more capital is fair *primâ facie* evidence that the property is in good hands, and doing good service to the public. It may not be a superfluous reminder also that it is not everything put forward as "in the interests of the ratepayers" that deserves acceptance on this pretence. Sometimes, as in the instance of Cheltenham, it happens that the ratepayers know their own business better than their representatives, which, as we have remarked, is an argument in favour of the Borough Funds Act.

Gas Companies not Obliged to Supply.

A REMARKABLE and interesting appeal case was heard in the High Court of Justice on Monday last week; and it will be found reported in our "Legal Intelligence" today. It was an action instituted by certain gas consumers of a district in Yorkshire, against the Earby and Thornton Gas Company, to recover damages for having been supplied with bad gas by the defendants. The case was first heard by the Skipton County Court Judge, who found that, though the plaintiffs had suffered damage to the amount of £50 as they alleged, he must give judgment for the defendants, on the ground that the action was not maintainable. This view of the law of the matter has been confirmed on appeal; but leave has been given to carry the matter further, apparently on the ground that the question at issue has never been raised before. This is what makes the case so remarkable, apart altogether from the merits—that it should have been left until the present time to try the question whether an individual consumer can recover damages from a Gas Company for having supplied him with bad gas. The facts do not appear to have been disputed. Plaintiffs are factory-owners who took a supply of gas from the defendant Company, who carry on their business under the protection of a Provisional Order; and on a specified occasion the supply was bad, and caused the plaintiffs annoyance and loss. Accordingly, they sued upon a claim put in several forms—for breach of contract, for breach of statutory duty, and for negligence. The question that arose upon this was as to whether, supposing the defendants to have done all that was charged against them, the proper remedy was not that of proceeding for the statutory penalty. Counsel for the appellants contended that there was a contract between the parties under which the Company were bound to fulfil their obligations, and that consequently an action would lie for breach. The County Court Judge thought otherwise, primarily because, as decided in *Atkinson v. The Newcastle and Gateshead Water-Works Company*, a private person has no right of action for breach of a statutory duty. To put it shortly, this was the view also taken by the Judges. Mr. Justice Wills, having stopped defendants' Counsel, laid it down that, where a duty is created by an Act of Parliament, the remedy for non-performance of such duty is to be that provided by the Act, and no other. It is not for an individual gas consumer who is aggrieved by the failure of a statutory Company to perform any of their duties to elect to proceed against the Company for damages. If such were the law, it would mean ruin to all public undertakers. Mr. Justice Wright took occasion to say that the obligation of the Gas Company, if any, in such a case as the present, does not depend on contract at all, but upon statute. There are contracts in respect of gas supply; but they only regulate the price or mode of payment. His Lordship also stated the ordinary rule of law—that where a general obligation is created by a statute, and the same statute provides a specific remedy, that is the only remedy. The curious observation was also made that there is no absolute obligation resting on Gas Companies to supply. However this may be, there is, said his Lordship, no contractual obligation. Counsel reminded the Court on this point that there is usually in Provisional Orders a proviso that no penalty is to be incurred by the undertakers in cases where it can be proved that the defect or insufficiency was due to unavoidable cause or accident. The importance of this observation lies in the possible applications of it. In the event of labour troubles, impossibility of procuring coal, or destruction of plant by accident or design, gas supply undertakers are not liable to penalty for stopping the supply. Labour agitators have

sometimes spoken and acted as though there is an obligation on Gas Companies to keep going under all conditions; but it is not so—fortunately for the community.

The Amalgamation of the Southern and South-West District Associations.

In noticing the recent meeting of the Southern District Association of Gas Managers, we did not comment upon the amalgamation of this body with the South-West Association, which was formally effected on that occasion. Both Associations are to be congratulated on this friendly conclusion of an episode that threatened at one time to develop in a less desirable fashion. From the exceedingly sympathetic remarks of Mr. J. W. Helps, the Honorary Secretary of the Southern Association, it transpired that the act of amalgamating the two organizations consisted simply in extending the membership of the former to the actual members of the latter—receiving them in a body without formality or fuss of any kind. Possibly after a while some of the gas managers domiciled in the more remote regions of the South-West Association may drop off from the enlarged Southern District Association. But it is to be hoped that those who can will remain, and resolutely make the new society their own. All roads lead to London; and it will really be much more convenient for anybody living in a town served by either the Great Western or the London and South-Western main line to run up to town for half a day than it has been for many to make their way across country by means of the particularly inconvenient link-lines that are supposed to unite, but as a matter of fact tend to keep apart, the people of the broad western counties. In vanishing from the list of gas managers' technical societies, the South-West Association will leave many pleasant memories behind with those who were in the habit of attending its meetings, which so often fell in agreeable places. Though there is no engagement to this effect, the Southern Association will doubtless try to meet occasionally in some locality which will specially suit the new contingent; and if the latter will only help the Committee in the matter of papers, the wisdom of the fusion of the societies will become the more apparent.

Official Inquiry into Industrial Disputes.

The Government Bill entitled "Conciliation (Trade "Disputes)" has been printed. It is also declared to be "a Bill to make better provision for the settlement of "trade disputes;" and there can be no question of the need for a workable measure of the kind. There is only one sort of Bill that is more required, and this would be something to prevent trade disputes from arising. For these things are like smoke, in respect of the condition that prevention is not merely better than cure, but is in point of fact the only cure. To return to the Government Bill, however, which is a well-intentioned and cleverly-designed measure, so far as it goes. It provides that any Board, established either before or after the passing of the Act, which is constituted for the purpose of settling disputes between employers and workmen by conciliation or arbitration, may be registered by the Board of Trade. Where there is an agreement in writing to submit to the arbitration of such a Board, or of any other person or persons, any present or future difference between employers and workmen, or between different classes of workmen, certain rules of procedure are to have effect, the principal object of which appears to be to rest the prospect of a satisfactory issue upon the good faith of the parties. Recognizing that no award of a Conciliation Board can be enforced by law, the Bill accentuates this feature by making everything permissive. Where a trade dispute exists, or is apprehended, the Bill proposes that the Board of Trade should be empowered to look into the matter, and initiate a variety of steps with the object of composing the difference. If it appears to the Board of Trade that, in any district or trade, adequate means do not exist for having disputes submitted to a Conciliation Board for the district or trade, they may, under the Act, appoint any person or persons to inquire into the conditions of the district or trade, and to confer with employers and employed, and, if they think fit, with the local authority itself, as to the expediency of establishing such a Board for the district or trade. Certain portions of the Arbitration Act, 1889, which are to apply to arbitration in trade disputes, are scheduled. The whole project is very simple, and does not appear to make any real difference in the existing law. The idea evidently is rather to focus public opinion upon trade disputes by the agency of official action than to bring legal pressure to bear upon the parties. Inasmuch as by this means a great deal of the misrepresentation that characterizes most industrial disputes ought to be checked, the Government proposal deserves a trial.

WATER AND SANITARY AFFAIRS.

According to a statement given in "The Times" on Thursday last, "it is understood" that the Government Bill relative to the water supply of the Metropolis will provide for the creation of a Trust, with clearly-defined powers, whose duty it will be to "formulate specific "proposals." In regard to the constitution of this new authority, "the suggestion is," we are told, that the Trust shall be composed of representatives of the City Corporation, the London County Council, "and certain Local "Authorities outside the Metropolitan area directly "interested." It is considered that "the first business" of this Trust will be to enter into negotiations with the Water Companies "with a view to ascertaining the best "means of dealing with the question." It is further signified that, should the Trust decide in favour of purchase, they will be empowered to initiate legislation for the purpose of acquiring the undertakings of the Water Companies. So far, the scheme proposes little, if anything, more than we find in the London Water Commission Bill, brought before Parliament by the Corporation of the City in 1891—a Bill which was rejected by Sir Matthew White Ridley's Committee on the ground of inadequacy, as merely constituting a public authority to promote Bills in Parliament on the water question. But the Corporation Bill had the merit of comprehending the entire area of "Water London;" provision being made for the representation of the outer districts. The same recommendation applies to the forthcoming measure to be introduced by the Government, and, in fact, has been the general idea with regard to any scheme for dealing with the London Water Supply, until we find the London County Council proposing to draw the line at the Metropolitan boundary, and favouring the project of a Kent Water Board, to take all the district of the Kent Company so far as it lies outside the Metropolis.

But the Government Bill, according to the present forecast, introduces a distinct feature, designed to meet "the possible event" of purchase being deemed "inex-"pedient" by the Trust. In that case, it is thought probable that powers of control will be vested in the Trust similar to those now exercised by the Local Government Board, "but considerably wider." Thus, it may be fairly acknowledged that, on the whole, the plan set forth in the Government Bill has a reasonable aspect, when viewed in relation to the circumstances which now beset the question. The scheme is comprehensive in its character, as providing a Water Authority extending over the entire area for which the London Companies have parliamentary powers of supply. The scope of the Bill may even go beyond this, so as not only to take in the 620 square miles of "Water London," but the whole 845 square miles declared by the recent Royal Commission to be "the "area of which the water requirements have to be con-"sidered." The magnitude of the question was well understood by the Corporation when preparing their London Water Commission Bill. Their Committee for County Purposes, in pointing out the extent of the area affected, argued that the whole should be placed under one Water Authority; and they unreservedly acknowledged that no one of the many County Councils concerned, "nor the "London County Council," nor the Corporation of the City, "could expect Parliament to entrust it individually "with the government of so large an area" as that which had to be dealt with. The London County Council have endeavoured to evade this conclusion—the force of which they evidently felt—by proposing to cut off the outer areas, and to take possession only of the inner circle. Such a procedure lies under the objection that it would create a congeries of water authorities in and around the Metropolis, thereby sacrificing the advantages that might be expected to accrue from complete consolidation.

Supposing the Government scheme to be adopted, and the Water Trust to be instituted as proposed, this newly

formed body will of necessity not merely enter into negotiations with the Water Companies, but must also proceed to become acquainted with the conditions of the supply. The information thus gained, as well as a discovery of the terms of purchase contemplated by the Companies, will doubtless guide the Trust in deciding whether or not it is "expedient" to buy up the Companies. It is possible that a Trust proceeding on such lines as are thus contemplated, would advise some system of control. It is also quite within the bounds of probability that such a system would be more popular than one of purchase. To the Companies, it will be a matter of vital concern as to the extent to which control is to be carried. But we presume the Trust will have to seek parliamentary powers for the exercise of their authority, and will have to "formulate "specific proposals" for the consideration of the Legislature. Thus Parliament would stand between the Companies and the Trust. One thing appears certain—that the Government are not going to place the administration of the water supply in the hands of the London County Council. The latter could not possibly have any such command, unless the Metropolitan Water Supply were separated from the outer areas—a severance evidently not intended by the Government. More will shortly be known on the subject. Six of the Council's Transfer Bills come on for their second reading on Friday; and Mr. Chaplin can scarcely avoid saying something on that occasion as to the Government measure. The Bills promoted by the Water Companies are also down for consideration on Friday, when it is expected that the Government will consent to their second reading, on the understanding that they shall be referred to a Hybrid Committee. The Government Bill on the Metropolitan Water Supply is to be introduced in the House of Lords, in charge of Lord James of Hereford; but it will possibly not appear until next week. As for the attitude of the County Council on this subject, it is mainly one of perplexity. The Council assume to be carrying out some very astute designs in Parliament; but it seems likely that they will very soon be left to the simple dignity of sending sundry representatives to sit on the proposed Trust. Unwilling to stand aside while Parliament decides as to the authority which shall take charge of the water supply, the Council resolved last Tuesday that the members in charge of the Transfer Bills should be authorized to move the second reading of the six. The Moderates, who had previously agreed to this, resisted the inference that the Bills were to go before a Select Committee, and sought for an adjournment, but in vain. They have thus put themselves altogether in the wrong. The "Daily "Chronicle" speaks of the Transfer Bills as having been "killed," but as having "since been revived again." For this resuscitation the Moderates are responsible, seeing they made no effort to prevent it. Their wavering policy has resulted in their own discomfiture.

Testing Water with Saprol.—In testing the water of wells for possible contamination by the leakage of cesspools, &c., Herr Nördlinger proposes to make use of saprol. This disinfective agent, which contains cresol, can be recognized by its odour in the proportion of 1 : 1,000,000; and even in dilutions of 1 : 2,000,000 is betrayed by its characteristic taste. It would therefore be necessary to pour saprol into cesspools which are suspected of infecting adjacent wells, and to examine the water of the latter as to its taste and smell.

"Holophane," Limited.—In another part of the "JOURNAL" will be found the prospectus of the Company formed, as announced last week, to acquire certain patents, patent rights, &c., relating to the construction of holophane glass globes, and the benefit, in any country except France and the United States, of all improvements in these patents. The capital is £100,000, in £1 shares, of which 65,000 are offered for subscription, 25,000 will be taken by the vendor in part payment of the purchase-money, and the rest will be reserved for a future issue. The list will close on Thursday, when, the working capital having been guaranteed, the Directors will proceed to allotment. Upon the directorate are Mr. Henry J. Davis, a Director of the Davis Gas-Stove Company, Limited; Mr. John Haynes, Manager of the Liverpool Gas-Fittings Company, Limited; and Mr. W. F. Leese, a Director of the House-to-House Electricity Supply Company, Limited. The new globes were described in the "JOURNAL" on April 16 last (p. 793); and they have been tested and reported upon by Professor Vivian B. Lewes, F.I.C., F.C.S. Mr. Fletcher Moulton, Q.C., has given an opinion to the effect that the claims in the British patent are valid.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 630.)

THE Stock Markets in general were dull and inactive last week. A depressed tone was set at the opening by the United States and Cuba incident; and it lasted pretty well through to the close. The enthusiastic reception accorded to Mr. Goschen's naval programme produced some buoyancy in Consols, which rose to 109⅞ *ex div.;* but afterwards reaction became general. Coupled with this was the prevailing inactivity, even in the speculative quarters, which were a prey to some anxiety in regard to questions outstanding with foreign powers; so that prices all through the list come out lower. The Money Market was in a state of extreme ease; there being no sort of demand commensurate with the supply. The Gas Market was not quite so busy, especially in the latter portion of the week; and a slight degree of reaction was apparent in two important stocks, after the very considerable advances recently made by them. But apart from these, the general tendency was very firm; and several issues made some nice additions to their already choice figures. Gaslight "A" opened at 307½; and though later it touched 308, it seemed to stick at something a point or two lower. This brought the quotation down a couple; but the last mark was no worse than 306½. Some brisk business was done in the "H" 7 per cent. limited; and it rather looked like going higher, but it did not. The "B" 4 per cent. limited, however, rose smartly. Business in South Metropolitans was only moderate. But prices were good; and the "B" advanced a point. Nothing at all was marked in Commercials; but the old stock gained two points. The Suburban and Provincial Companies were again conspicuous for strength. Business was necessarily very quiet for lack of stock; but anything offered was sure to command a good figure. Brentfords had a considerable rise. In the Continental group, Imperial was one of the Companies that underwent a reaction. It stuck hard at 254½ for some days; and at the close, the quotation was lowered a couple of points. Union, however, pushed up a point; and European, though unchanged, was strong and steady. Several of the more remote undertakings progressed; Belgrano, Cape Town, Monte Video, and San Paulo being gainers, while none suffered a reverse. Water was again most buoyant; and business was unusually brisk. Nearly all the Companies have gone up in value; and the increase in some of them is considerable.

The daily operations were: Transactions in Gas on Monday were pretty lively, especially in Gaslight "H;" and prices were good. Brentford old rose 3; and Monte Video, ½. In Water, both Lambeths gained 3; and Southwark, 1. Tuesday was much quieter; and the only move was an advance of 1 in South Metropolitan "B." Wednesday was not much more active; but quotations were more on the rise. Commercial old went up 2; Continental Union, 1; and Belgrano and San Paulo, ½. In Water, Kent advanced 5; and New River debenture, 1. Thursday also was a quiet day in Gas; and the only move was a rise of 1 in Cape Town debentures. In Water, New River improved 3; Lambeth, 2; and Southwark, 1. The Gas Market remained in the same condition on Friday, and nothing changed. East London Water rose 3; and Grand Junction and New River, 1. Movements in Gas were irregular on Saturday. Brentford new moved up 2; and Gaslight "B," 3; but ditto "A" and Imperial Continental fell 2. In Water, both Lambeths rose 5; New River, 3½; ditto debenture, 4; Southwark, 2; and ditto "D," 5.

ELECTRIC LIGHTING MEMORANDA.

Disillusionment at Worcester—Water Power a Failure—A Day Load no Panacea—The Brighton System of Charging for Electricity.

THOSE who still retain some faith in the forecasts of electricians respecting the practicability of making municipal electric lighting ventures pay by working into the electric supply business all sorts of presumed accessory advantages—such as water power, refuse destruction, and so forth—may be recommended to study the recent report of the Borough Electrical Engineer (Mr. E. T. Ruthven Murray) to the Worcester Corporation Electricity Committee. This statement is reproduced in full in the current number of the "Electrician." We criticized this particular example of Mr. W. H. Preece's skill on Oct. 23, 1894, immediately after the station had been formally opened by the Mayor (an account of which ceremony appeared in the previous issue of the "JOURNAL"). On this occasion, the Mayor made a sanguine speech; Mr. Preece followed in the same vein, only more so; and Sir Douglas Galton wound up the oratory with an address congratulating the people of Worcester on being the first to utilize to a considerable extent the natural advantages which lay right to their hand for the creation of motive power in the generation of electricity. "The saving of fuel obtained by the use of water," he said, "would enable them to supply the current at a price which would make it nearly as cheap as gas. This was a great achievement, and opened up a remarkable

vista for English towns." Our comment on the affair was that "the Worcester combination is an example of the spending of sixpence in order possibly to save a penny;" and we expressed the hope that the ratepayers would not be impatient for the arrival of the period of great financial success promised them by their Mayor.

How many electricians' prophecies of financial success will bear the test of a year or two of experience? Certainly the Worcester municipal forecast has gone very wrong. Mr. Murray has had to inform his Committee that the expectation of saving fuel by the so-called "utilization" of water power has wofully failed. As a matter of fact, the cost of fuel per unit of electricity generated at the Worcester station averaged last year 1·06d., which is greatly in excess of the corresponding charge in the majority of central stations. The Engineer's report observes on this head: "There are several reasons why this figure is so large; and pre-eminent is the fact that the available water power did not come anywhere near its calculated value, with the result that, from the end of May until the end of November, it was necessary to run a portion of the day on steam only. About midsummer, there was so little water in the Teme that as much as 75 per cent. of a total week's running hours were done on steam power. As the engines at the works are all of 286 indicated horse power, we had no choice but to run these at the very low load which was the maximum that could be obtained, and at a load factor so small that high efficiency and low consumption of steam, and, therefore, of fuel, was impossible. A condenser was thought unnecessary when the works were equipped"—and also, as it appears, the scale on which the steam power was provided was wholly unsuitable to the actual needs of the station.

Great things were hoped at the start as to the results of the "day load" which was found for the Worcester station, in pumping water at the Corporation water-works, three miles distant. Here another disillusionment has to be recorded. The day load was an incubus that necessitated the burning of 400 tons of coal to keep only a single motor going during the summer. As, moreover, the residents in the vicinity of the station objected to the smoke which the consumption of so much cheap Staffordshire coal produced, the Committee ordered that smokeless Welsh coal should be burnt, which greatly increased the working expenses. The supreme beauty of the whole arrangement, however, consisted in the fact that the supply of electricity for this extremely advantageous day load was contracted for at only 1d. per unit, which did not pay for coal; so that, as the Engineer told his Committee, "instead of making anything out of the day load found by these motors, you have actually lost money by having them on circuit."

Nevertheless, the Worcester Engineer concludes his report by offering his Committee a crumb of comfort in the reflection that things are likely to be better by-and-by, seeing that the number of lamps taken on during the past year shows the gratifying increase of 200 per cent. This is all very well; but in cases like this, it is not percentages, but numbers, that are important. What the Worcester ratepayers are concerned to know is how far the volume of business done and in prospect goes towards justifying the promises of those who spent their money upon the establishment of the station. It is to be noted that even the "Electrician" turns upon the fatuous design—declaring (rather late in the day) that it contends "that water-power schemes in this country are not, as a rule, likely to prove economical, and that day load does not of necessity spell profit." We do not recollect whether our esteemed contemporary did anything at the time to prevent the unfortunate Worcester ratepayers from being beguiled in this matter. The last has not yet been heard of the Worcester troubles.

An interesting article appeared in last week's "Electrical Review," on the subject of the electric lighting of Brighton, with particular reference to Mr. Wright's system of differential charging for current. It is claimed that, as a consequence of the adoption of this system, the town of Brighton numbers more customers for electric light per thousand of the population than any other large town in Europe. "For out of 25,000 buildings of all descriptions, 1100—or between 4 and 5 per cent.—are fitted with the electric light; and the number is rapidly increasing." Even so, the proportion of consumers does not strike one as high, for the most electrified town in Europe. If this is the present fruit of electrical enterprise in Brighton, special as the character of its residential buildings is, the argument for municipal adventure in the same line in less favoured centres of population becomes very thin. However this may be, it is claimed that, by the Wright system of charging, the local public as well as the supply undertaking are greatly benefited. Electricity, we are assured, in Brighton has become the "poor man's light," inasmuch as where the Wright system attains its greatest scope, which is stated to be in "the artizan shopping districts," the charge for electricity is much lower than it is in the higher class thoroughfares, "and actually at a less cost than gas." We have nothing beyond the assertion for this, and cannot see how such a favourable result can follow from a system of charging which demands full price for all electricity taken during one or two hours daily, and less than half as much for the remainder. Even in the winter quarters, the time over which the higher rate extends totals up to a higher charge per night than the remainder is responsible for. The average charge per unit for the past year for the whole of the district works out to something less than 4¾d., which is equivalent to gas at 4s. 9d. per 1000 cubic feet. The whole of a consumer's bill would have to be made out at less than 3d. per unit to bring the light down to the equivalent cost of gas. Doubtless, the Wright system is an ingenious one; and the circumstance that sixteen other towns have copied the Brighton initiative in this respect, is a feather in Mr. Wright's cap. But we must await longer experience before agreeing to the proposition that it is anything more than a palliative of the organic evil of dearness which renders the electric lighting business so unhealthy financially.

THE STORAGE AND EXPLOSION OF COMPRESSED GASEOUS MIXTURES.

The report of the Committee appointed to inquire into the causes of the explosion and the precautions required to ensure the safety of cylinders of compressed gas, has just been issued as a Blue-book. The Committee consisted of Professor Unwin, Professor Boys, Professor Dixon, Dr. Dupré, and Rev. F. J. Smith; and the points referred to them by the late Home Secretary were four in number, and of great practical interest. They comprised the probable causes of the explosions of gas cylinders; the precautions to be observed in the manufacture of gases and cylinders for storing them under pressure; the question whether the risk of accident in this regard is so great as to render desirable any interference, inspection, or control of this branch of trade in gas; and, generally, any matters connected with the trade which might appear to call for attention or regulation. The reference grew out of the Fenchurch Street Station case; and Dr. Dupré's report on this catastrophe was suggested as the starting point for the investigations of the Committee. We are glad to be able to bear witness to the thoroughness with which the Committee have performed the task entrusted to them, and consider that the thanks of those engaged in the fast-developing trade in compressed, portable gases are due to the Committee for the broad view they have taken of the subject. The recommendations of the report are well calculated to place the new industry upon a satisfactory basis in relation to the interest of public safety, while not putting any unnecessary obstacle in the way of its development. Portable gas lighting by means of illuminating gas contained in cylinders, is not at present a considerable trade in the United Kingdom; but yet there is a good deal more compressed coal gas sold for various purposes than is generally suspected, especially for use with the lime-light. The modern experimental use of acetylene for lighting purposes, lends additional interest to the conclusions of the Committee. This last-named departure in invention is, however, not noticed by the Committee; and it is to be hoped they will not have to be called together again to deal with it by circumstances similar to those that led to their original appointment.

The present Blue-book ought to be in the hands of everybody interested in the subjects with which it deals. The Committee held a series of meetings, and examined as witnesses some manufacturers of gas compression cylinders and some of the engineers of firms whose business it is to manufacture and compress gases. They also visited works where oxygen, hydrogen, carbonic acid, ammonia, and nitrous oxide are manufactured, and where these gases, as well as coal gas, are compressed. In addition, they carried out many experiments designed to throw light on the causes of gas cylinder accidents, and the amount of damage such explosions are likely to cause. The Committee acknowledge that every assistance was given them by the firms whose operations came under their notice, who are admitted to be quite willing to co-operate with the Government in regard to taking whatever steps may be found necessary and expedient for rendering the industry a safe one in all respects.

The Committee observe that the development of the trade in cylinders of compressed or liquefied gases during the last ten years has been enormous; and they believe it is likely to become larger still. Much of this is due to the introduction of the Brin process for making cheap oxygen, which soon gave rise to an extensive commerce in cylinders of compressed oxygen and compressed coal gas—chiefly used for lime-light illumination in theatres. For this purpose, the lime-light is stated to be steadier and more manageable than electric light. In 1894 the output of the Brin's Oxygen Company in London was 100,000 cylinders; and, considering the extent of the business, the number of accidents due to the carriage and handling of gas-cylinders of all sizes—many of them charged to a pressure of 120 atmospheres, or 1800 lbs. to the square inch—has been very small. This fact would tend to show that the trade must be carried on with satisfactory care, and diminish the requirement for official inspection. On the other hand, compressed gas-cylinders are distributed all over the country; and when accidents happen to them, it is quite likely to be in public and crowded places, thus occasioning much public excitement and discussion. Moreover, on general principles, such traffic obviously needs systematic regulation, and is already, as a matter of fact, regulated by railway companies and other interested parties. These regulations and restrictions are not always consistent or well considered; so that it would be a good thing to have the question of supervision or safeguards settled by competent authority.

A good deal of the trouble in the compressed gas trade has

arisen from the circumstance that suppliers of compressed oxygen are also suppliers of compressed coal gas; and there have been cases where the two gases have been inadvertently mixed in the cylinders. This is easy to understand; but, as the Committee observe, such a mixture would still be harmless unless ignited, and it is much more difficult to explain the ignition than the confusion of the compressed gases. This effect has been supposed to be producible by the rapid oxidation of oil or grease present in the cylinder, or by the similar action of the oxygen upon small metallic fragments left in or knocked off from the inside of the cylinder. Unfortunately, the test experiments instituted with a view to proving these hypotheses all had negative results; so the Committee are "driven to regard the causes of these explosions as still obscure."

The Committee find that cylinders containing explosive mixtures of gases are "not now, so far as is known, ordinarily sold in trade." The phraseology is mysterious; its most obvious meaning being that what is not now done either has been or may in future become a practice. The assertion is, indeed, made that such cylinders of mixed gases are sometimes used privately, which it occurs to us is a most reprehensible proceeding. It is, of course, quite possible for mixed oxygen and hydrogen, or oxygen and coal gas, to be stored and used without apparent danger; but, as the Committee remark, explosions of such mixtures have occurred from obscure causes. It is pointed out that 1 lb. of a mixture of oxygen and coal gas, in the proportions required for complete combustion, would, upon ignition, develop about the same energy as 3½ lbs. of gunpowder. The Committee therefore suggest that cylinders of such mixtures should be treated as coming under the Explosives Act. It would be better to prohibit the storing of such mixtures, except where some necessity for them is specially shown.

The Committee discuss luminously, and at length, the whole subject of the manufacture and testing of compressed gas cylinders, and give valuable particulars as to the scantlings to which such cylinders should be worked. It is observed that for oxygen, hydrogen, and coal gas the usual maximum pressure of 120 atmospheres provided for in this country is sufficient; but the Committee see no good reason why higher pressures should not be allowed, with corresponding adjustment of the strength of the cylinders. Some curious observations are made on the subject of the "wear and tear" of the cylinders, which appear to become weakened, in some unexplained manner, by use.

With regard to the desirability of precautions tending to prevent the accidental mixture of gases in cylinders, the Committee observe that "it is much to be regretted that a uniform system of securing that coal-gas and hydrogen cylinders should be incapable of attachment to fittings intended for oxygen has not been adopted, and still more, that some firms neglect this precaution altogether." While deprecating the making by local authorities of regulations to this end, which might conflict with the arrangements of the larger gas-compressing firms, the Committee think manufacturers should be enjoined to use the left-handed screw for all cylinders intended for combustible gases. The practice of some firms of refilling partially emptied cylinders is condemned. The attention of the Committee having been drawn to various local regulations as to the use of compressed gas in theatres and other public places—some of which entail the decanting of the gases or their conveyance for some distance in pipes—they take the opportunity of declaring that, with good cylinders, the direct use of gas without intermediate piping or storing is the safest.

In concluding their report, the Committee advise that some control of the trade by official inspection is desirable. This inspection might, it is suggested, be applied to the gas-compressing factories, which, when found satisfactory, would be certificated. Such certificated factory would be allowed to place a test-mark of their own on their cylinders. In addition, cylinder-testing establishments might be certificated in the same way. This appears to be a sensible way out of the difficulty created by the circumstances of the trade, which render it desirable that the responsibility of the firms should not be affected by whatever is done in the way of cylinder testing and stamping.

The report is supplemented with some interesting minutes of evidence and accounts of experiments. Professor Unwin conducted some experiments to ascertain what mixtures would be necessary to burst cylinders in ordinary use, and how violent such explosions are likely to be. His conclusions from these tests were that, in the cases of mixed gases at high pressure, no cylinder that is practicable can be made to withstand their explosion. In the case of gases at high pressure, any mixture that will burn at all, will so raise the pressure as to endanger, and possibly burst, a good cylinder. Several cylinders of different makes were blown to pieces in these experiments; their contents being fired by electricity. Rev. F. J. Smith carried out an experiment in a field near Oxford, to ascertain the effect of firing a cylinder containing some "coal-gas oil" and oxygen, under a pressure of 100 atmospheres. The fluid was taken from the surface of water which had collected in a gas service-pipe about 1¼ miles from the gas-works. The interior of a 5-feet cylinder was wetted with 3 cubic centimetres of this liquid, and filled up with the oxygen. It was placed nearly vertically in a recess cut at right angles to the side of a well 5 feet deep and 2½ feet square. Four oak posts, each weighing about 14 lbs., were laid over the mouth of the well, half-closing it. The electrical circuit was closed after the gas and oil vapour had mixed for ten minutes. Three seconds later, the cylinder exploded with a loud report, raising two of the posts a foot into the air, and sending up a cloud of earth to a height of 60 feet or more. "The cylinder was whole after the explosion; a rent being formed from the neck to the base. Two flaps were turned back, each through over 180°. The neck and the hemispherical end were slightly brought together, owing to the part left of the cylinder being blown outwards. The edges show that the metal had been thinned by the explosion. The appearance of the burst at both the neck end and the base is that of torn metal. . . . The coal-gas oil burnt slowly from a rod moistened with it, forming a dense black smoke; and a rod wetted with it was brought close to a flame, almost touching it without igniting, the temperature of the air being at the time 10° C. = 50° Fahr." This gas-oil must be really terrible stuff; and it is evidently this, rather than the coal gas itself, that works such mischief when an accident occurs with inadvertently-mixed gases. The accounts of other experiments are worth reading.

OBITUARY.

Mr. W. Crabtree, M.Inst.C.E., the Borough Engineer of Southport—a position he had occupied since the incorporation of the town in 1867—has lately died in his 68th year.

Mr. J. W. Ilott, the Deputy-Chairman of the Bromley Gas Consumers' Company, of which he was one of the original promoters and Directors, died recently at the age of eighty.

The death is announced, at the advanced age of 84, of Captain Henry Townshend, of Caldecote Hall, Nuneaton, one of the Directors of the South Staffordshire Water Company. Deceased took the leading part in the formation of the East Warwickshire Water Company, of which he was the Chairman.

PERSONAL.

Mr. W. C. Young, F.I.C., F.C.S., has been appointed Gas Examiner to the Worthing Town Council.

The net value of the estate of the late Sir Julian Goldsmid upon which duty has been paid amounts to £1,093,493.

Mr. S. Tomlinson, M.Inst.C.E., the Bombay Water-Works Engineer, has been appointed Engineer-in-Chief to the Municipality of Singapore, in succession to the late Mr. J. MacRitchie.

Mr. Mervyn P. Crofton, who occupied the position of Supervisor in connection with the Dublin Corporation Water-Works, has resigned through ill-health, and has been granted a pension of £280.

Mr. Whimster, the eldest son of Mr. J. Whimster, of Armagh, who is just completing his articles with Messrs. R. Laidlaw and Son, of Glasgow, has been appointed Assistant to Mr. D. M'Callum, of Omagh.

Mr. G. T. Lee, the new Town Clerk of Dewsbury, has been appointed Clerk to the Dewsbury and Heckmondwike Water Board, on the understanding that Mr. Macaulay, Clerk of the Heckmondwike Council, performs the conveyancing work connected with the Board.

Mr. N. E. B. Garey has been elected Chairman of the Continental Union Gas Company, Limited; Mr. Arthur Lucas, Deputy-Chairman; and Mr. W. J. Shorthose to a seat on the Board. The new Chairman is upon the directorate of the European and Oriental Gas Companies; and the Deputy-Chairman is one of the Directors of the Imperial Continental Gas Association.

Dr. Sidney Williamson, F.I.C., F.C.S., has been awarded by the Executive Committee of the City and Guilds of London Institute the Second Salters' Company's Research Fellowship for the encouragement of higher research in chemistry in relation to manufactures. Dr. Williamson proposes to work on some questions bearing on food-stuffs generally, more particularly the examination of some definite albumenoids, with the ultimate object of ascertaining the influence of various manures on the growth of crops in so far as quality of produce is concerned.

The Sale and Use of Petroleum.—A Select Committee of the House of Commons has been appointed to inquire into and report upon the sufficiency of the law relating to the keeping, selling, using, and conveying of petroleum and other inflammable liquids; and the precautions to be adopted for the prevention of accidents with petroleum lamps.

An Automatic Feed-Water Softener.—All owners of boilers are too well aware of the trouble and expense caused to them by the formation therein of scale and stone, as the result of using hard water. Several processes have been devised, and appliances constructed, for treating the water before its admission to the boiler, with the view of bringing about precipitation of the stone-forming constituents; and one of the latest is Herr Julius Bruun's automatic feed-water softener, which has been taken up by Messrs. Kirkham, Hulett, and Chandler, Limited. It is claimed for this apparatus that it is an absolute scale preventer; and its worth in this respect has been vouched for by Mr. F. D. Marshall, of Copenhagen, who has it in use in connection with eight boilers, having a total of 160-horse power.

1891—1895.

If, in the course of the year 1890, it had been possible for some writer of authority to prepare a correct forecast of the progress that would be made in connection with gas undertakings and gas consumers during the next five years, he would have been scoffed at as a veritable Mother Shipton for his pains. If he had claimed that, before the end of 1895, prepayment meters would be in general demand all over the country, that one company alone would own to having 30,000 customers supplied on this system, and be taking copper money at the rate of three tons weight per week, in conjunction with fittings and stoves supplied without any first cost whatever to the tenant; if he had said that, within the same period, a system of lighting by gas would have come into general use, capable of yielding, in actual practice, some 20 candles value for every cubic foot of so-called 16-candle gas consumed, to say nothing of improvements in gas appliances for other than lighting purposes; and if he had asserted that a profit-sharing scheme extended to every employee would be in full operation at a London gas-works, and that inclined retorts, water-gas generators and superheaters, and machinery for the transit of coal and solid materials generally, would have become common in our larger gas-works, while various oil-gas and carburetting processes for enriching gas would have become so general, with the aid of petroleum at 3d. per gallon or less, as to reduce the commercial value of all kinds of cannel at least one-third—he would simply have been relegated to the numerous and not altogether unpopular class of those who prophesy too much.

Yet all this has been done, and more. Though the public press has not been exploited, though no popular science lecturer has startled his audience, or inspired marvellous paragraphs to go the rounds of the newspapers, though no means whatever have been taken in the way of attracting public attention, this degree of progress can readily be sought out and proved from the pages of current literature, especially under the heading of meetings of gas companies. When we think of the ingenuity that has been applied (or rather misapplied) in forecasting the progress of other industries, it is sad to think of the excellent opportunity for astonishing the world, that was allowed to drift away in 1890.

The advancements above mentioned form a very fair record for an industry that has been pronounced to have already reached its zenith and commenced a downward course on the other side. But our hypothetical prophet might have gone on to speak of the increased demand for coke for household purposes and amongst small users of fuel in general. If the coal famine has left us with depleted reserve funds, it has also left a permanent increase in the public appreciation of coke as a fuel, that will remain with us long after the reserve funds have been restored to their normal proportions. It is true that, in the case of some of our largest gas undertakings, the successful disposal of the very large quantities of coke that are being continuously turned out is still a consummation to be wished. But in the average provincial gas-works, stocks are now run lower, and there is a marked increment in the commercial value of coke as compared with coal. It would be easy to quote cases where the yard-price of the day is on the right side of the contract price of coal—that is to say, where the coke is retailed at (say) 13s. 4d. per ton, while the coal is delivered on the works at 13s. No doubt the general adoption of coke-breaking machines has had much to do with this; but the chief cause is the fact that when coal was dear, many persons were led to try coke who had never used it before, and were surprised to find that it could be made to do good service in the kitchen range, and even in ordinary grates.

It is permissible here also to refer to the remarkable appreciation in the value of all kinds of gas shares and stocks. The extensive frauds in connection with unlimited companies of various kinds in our own country, and the various difficulties and entanglements abroad, have led to a marked preference for home securities carrying no further liabilities than the nominal value of the shares. But this preference alone would not cause such appreciation, in the absence of the stability and progressiveness above indicated. It would be invidious to compare the gas industry with other trading ventures; but the managers of gas undertakings may safely take credit for a large share of the high standing attained by gas securities. Shareholders have benefited by this appreciation so far as existing stock is concerned. But it is only fair to emphasize the fact that, as regards new stock, the effect of the auction clauses is to place the whole of the appreciation to the credit of the consumers in the form of non-dividend bearing capital. Each accretion of premium capital serves to lower the average rate of dividend, and to reduce the dividend charge on each 1000 feet of gas. It also serves to reduce the proportion between the invested capital and the annual revenue.

The object in view, in thus cursorily directing attention to matters with which most of our readers are already well acquainted, is to show that the gas industry has entered upon a course of steady and active progress, which is none the less real because it is unobtrusive and quiet. Its field of action has expanded in several respects. In the retort-house, which up to a comparatively recent period was conducted upon one model, we now find machinery for drawing and charging retorts, various arrangements of gaseous firing, the inclined-retort system, oil-gas processes, and the water-gas cupola for helping off the excess of coke which is always objectionable wherever it is found. And in dealing with the consumer, the steady-going jog-trot meter-rent is supplemented in various ways. The gas cooking-stove on hire is now universal. Added to this we find gas-fires, high-power lamps, and other appliances, in many instances; while the fitting up of small tenements with a complete equipment of two or three lights, a gas cooker, and a prepayment meter is now becoming familiar to all. The incandescent gas-light system for street lighting is now within the bounds of practicability, and several towns are served by it—the whole plant being usually fitted up and worked by the gas company.

But gas engineers have not reached a "rest and be thankful" stage. The period under review has not been one of unqualified prosperity. There were labour questions to be dealt with, and the coal famine, from the effects of which we have barely recovered. These things serve as reminders that difficulties and unfavourable circumstances may arise at any time. Just now we appear to have reached a period of fair weather, and coal and iron are cheap. It is well to remember that the troubles of 1892-93 did not find everybody fully prepared, notwithstanding the easy times that had immediately preceded. While one may take encouragement from the numerous improvements and advancements that have been effected, it is needful also to take warning from the difficulties that have been encountered. Gas consumers expect their full "tale of bricks," whether "straw" is scarce or plentiful; and therefore prosperous times are simply opportunities for strengthening resources and getting in the best possible trim for encountering adversity when it comes.

NOTES.

Effects of the Products of Combustion in a Gas-Engine Cylinder.

At a recent meeting of the Association of Yorkshire Students of the Institution of Civil Engineers, Mr. F. Grover, Assoc. M.Inst.C.E., of the Yorkshire College, Leeds, read a paper on the above subject. Dealing with the present greater economy of gas-engines, the lecturer said this was chiefly due to the increased compression given to the explosive mixture before ignition. During recent years, manufacturers of gas-engines had introduced a "scavenging" stroke, or its equivalent, for expelling the products of combustion. The effect of this was undoubtedly to increase the power of any given size of engine, and thus incidentally to raise its mechanical efficiency. For this reason, it was distinctly advantageous to expel the burnt gases. To investigate the effects of the presence of these gases upon the pressure obtained, Mr. Grover had carried out a long series of experiments in the engineering laboratory of the college. He ignited pure mixtures of gas and air in the proportion of from 1 to 16 volumes up to 1 to 6 volumes; and to each pure mixture, 5 per cent. (by volume) of products of combustion were added. The pressures obtained after the addition of each 5 per cent. were recorded upon a revolving drum by means of a Crosby indicator. Proceeding in this way, burnt gases were added by increments of 5 per cent. by volume until the mixture became inexplosive. The general conclusions deduced from these experiments were as follows: (1) That the highest pressures are obtained when the volume of air present is only slightly in excess of the volume required for complete combustion. (2) That in some mixtures higher pressures are recorded when residual gases take the place of an excess of air. (3) That when the volume of products of combustion does not exceed 58 per cent. of the mixture, it is explosive, provided the volume of air is, not less than 5·5 times the volume of coal gas. (4) That the time of an explosion is much reduced when excess of air is replaced by products of combustion. The author is continuing the experiments upon compressed mixtures; and the few experiments already made show that the deleterious effect of burnt gases is much overrated in the case of coal gas products.

A New Application of an Old Pipe-Joint.

At a recent meeting of the Manchester Association of Engineers, Mr. J. G. Stewart read a paper upon the modern developments of practice in regard to the design and manufacture of steel mains and joints. Feather-weight pipes in mild steel, lap-welded, are now obtainable of metal as thin as No. 12 wire gauge. There have been 25-inch mains made of this material, 3-16ths inch thick. A steel suitable for welding, and capable of bearing free heating, can be produced at little higher cost than the ordinary boiler-plate. It can be welded so as to show at the welded part an average strength and elasticity in no way inferior to the rest of the pipe. The nomenclature of the trade is by no means settled; and Mr. Stewart complains of the lack of standards. But it is understood that the word "tube" means properly something under 6 inches diameter. Above this diameter, the cylinder is called a "pipe." A tube is designated by its outer, a pipe by its inner diameter; but all gas-tubes are usually measured by internal diameter. There is evidently room for much misunderstanding here. A curious point of Mr. Stewart's paper was the illustration it yielded of the wisdom of the old technicians who first devised the common spigot and socket joint for cast-iron mains. It is

declared that the best permanent joint for thin steel pipes is a copy of the same joint, which is moulded out of the substance of the ends of the tubes themselves; the only difference being that the lead space is made smaller, so as to require only one-third the weight of metal commonly used in making a lead joint in a cast-iron main of the same size. The ease and rapidity with which this joint is made, and its slight elasticity, are its principal recommendations.

A Test for the Coking of Coals.

M. Louis Campredon has made a suggestion, in the "Comptes Rendus," of a way of determining experimentally the binding or coking power of coal, which is at any rate deserving of notice as a contribution towards the solution of a very difficult practical problem. In the usual or ultimate classification of coals, there is nothing to indicate their binding or coking power. It is well known that coals may be identical, or resemble one another very closely in chemical composition, while differing widely in their capacity for producing coke. M. Campredon was led to experiment upon coal to ascertain its binding quality by consideration of the methods used in cement testing. His principle is to mix a sample of the powdered coal to be tested with a proportion of an inert substance, as sand, and carbonize the mixture in a closed vessel. The more residue appears in solid form, the more binding the coal. With a constant weight of coal—say, one gramme—is mixed different proportions of sand, until the proportion is arrived at which will just carbonize into a solid lump with the particular sample of coal. Taking the weight of the coal as unity, the weight of the agglomerated sand will give the ratio of binding or coking quality. This power is *nil* for a coal yielding only powdery coke, and rises to 17 for a strongly-coking coal, and 20 for gas-works pitch. The experiments are easily performed with small crucibles; and the results are instructive. Curiously enough, while the ultimate composition of a sample of coal from Lens (Pas de Calais) was but little changed as the result of heating it to a temperature of 100° C. for a whole year, its coking power was completely destroyed thereby.

Lighting by Diffusion from the Ceiling.

A noteworthy experiment in the incandescent electric lighting of a large interior has been carried out in the new Cornhill building of the Union Bank of Australia. Mr. Cuthbert, the Architect, has designed for the great hall an electrolier in the shape of a bronze dish, brightly tinned inside, which can be suspended from the ceiling, and contains inside three 25-candle power lamps, the light of which is reflected to the ceiling and thence diffused about the room. The main hall of the bank is lit by 24 of these electroliers; and so well is the light diffused, that it is impossible to make a shadow appear upon a sheet of paper by holding a pencil over it. As no direct view of the lamps can be obtained, the eyes of those working in the bank are not dazzled. The system of lighting by means of inverted arc lamps has been known for many years in this country, and has been employed in some workshops and factories. But the experiment now in question is one of the first of the kind in which incandescent lamps have been employed. It might be thought that the loss of light would be considerable; but the reflective power of a whitewashed ceiling is much greater than is generally supposed. Mr. H. E. Harrison, the electrician to the bank, has ascertained that the loss of light by this method is only 20 per cent.; and as the light is so diffused, the pupil of the eye is more dilated and consequently the apparent illumination may be even better. In the bank corridors, the same system of lighting is carried out, except that the lower parts of the glass globes are silvered, so that the light is first reflected upon the ceiling and then thrown downwards. The general effect is reported as an improvement on the use of frosted globes.

Induced Furnace Draught.

The subject of furnace draught and the treatment of waste gases has received further elucidation though the labours of Mr. Patterson, who, in co-operation with Messrs. Paul and Co., of Dumbarton, has perfected a system of suction draught and smoke prevention for boiler fires that has been favourably reported upon by Professor Archibald Barr, of the University of Glasgow. The essential feature of the system is the exhaustion of the furnace gases by means of a fan, through the centre of which a jet of water is sprayed out among the vanes; serving the double purpose of keeping the fan and its casings cool, reducing the temperature and consequently the bulk of the gases to be operated upon, and washing down any solid particles of carbon or ash that may be carried forward in the gases. The result of the working of the apparatus is reported to be that the escape of dark smoke is prevented, while the solvent action of the water-spray reduces considerably the quantities of the invisible noxious fumes which would otherwise be present in the expelled products of combustion. This is stated to be effected not only without prejudice to the efficiency of the boiler to which the arrangement is attached, but even to increase the rate of evaporation by 66 per cent. as compared with natural draught. The analyses of the fuel used and the gases produced during Professor Barr's tests were made by Mr. R. R. Tatlock, the City Analyst of Glasgow. These showed that the system is capable of dealing with ease with boiler furnaces so forced as to burn 44½ lbs. of coal per square foot of grate surface per hour.

TECHNICAL RECORD.

RESEARCHES ON THE COMBUSTION OF ILLUMINATING GAS IN COOLED FLAMES AND GAS MOTORS.

By Dr. F. Haber and A. Weber.

These researches, of which the full account appears in the "Journal für Gasbeleuchtung," were carried out in the Chemical-Technical Institute, Carlsruhe, at the instance of Dr. H. Bunte.

The result of a number of investigations on open gas-flames, not smoking or flickering, proves that only the merest traces (thousandths per cent.) of combustible gases escape from the flame with the carbonic acid and aqueous vapour. It is likewise established that gas-flames with an ample supply of primary air, when in contact with incandescent surfaces, do not discharge combustible gases among the products of combustion. This fact is of immense importance in judging, from a hygienic standpoint, incandescent gas lighting. The combustion of gas for lighting purposes has thus been exhaustively treated; but satisfactory investigations on the products of its combustion for heating in contact with cold surfaces, or for the development of power in gas-engines, are still wanting. The combustion of gas for heating a cold object plunged in the flame, is carried out in apparatus for cooking by gas; and it has been investigated, so far as the origin of combustible gaseous products is concerned, by Professor Vivian B. Lewes.* He took a double-bottomed saucepan, the outer bottom of which had a central opening through which a bunsen burner was introduced, so that, in one experiment, its flame spread over the inner bottom, and in another touched it with its tip only. In the first case, the mouth of the bunsen burner was ½ inch below the inner bottom; in the second, it was correspondingly lower. The saucepan contained water. The gaseous products of combustion were drawn off at the side of the chamber, between the two bottoms; and the aqueous vapour and carbonic acid were quantitatively estimated by absorption, and acetylene was removed by solution of silver. The residue was then passed over palladianized asbestos, heated to 220° C. The carbonic oxide and hydrogen were said to be thus converted to carbonic acid and water, which were absorbed as before; while the methane was quite unoxidized. Finally, the methane was converted by red-hot palladianized asbestos into carbonic acid and water, which were taken up by another set of absorption apparatus. The following results, calculated for the final gas free from air, were thus found:—

	Bottom of Vessel 12 mm. above Mouth of Burner.	Tip of Flame just Touching Bottom of Vessel.
Nitrogen	75·75	79·17
Aqueous Vapour	13·47	14·29
Carbon dioxide	2·99	5·13
Carbon monoxide	3·69	—
Methane	0·51	0·31
Acetylene	0·04	—
Hydrogen	3·55	0·47

These results are in several respects unsatisfactory. The arrangement of the experiment leaves a considerable source of error. One thousand volumes of (average) coal gas require 1150 volumes of oxygen for combustion, and form 4900 volumes of spent gas—ignoring aqueous vapour—which contains about 12 per cent. of carbonic acid, and 88 per cent. of nitrogen. For smokeless combustion, however, an excess of air is always required; so that with Professor Lewes's arrangement, not more than 9 per cent. of carbonic acid could be present in the final gas. Thus at least 6·5 volumes of combustion products are formed with the volume of coal gas. It is not practicable with such a complex apparatus as Professor Lewes's to aspirate more than 6 c.c. of gas per second through it. A bunsen burner consuming 50 litres (1·766 cubic feet) of gas per hour produces 325 litres (11·478 cubic feet) of spent gases per hour, which postulates a rate of 90 c.c. of gas per second through the absorption apparatus. Therefore it is to be assumed that Professor Lewes only aspirated out a portion of the spent gases, while the bulk sought some other exit. The only possible one, with his arrangement, is the annular space between the burner-tube and the outer bottom; and it is through this space that the secondary air is admitted. The direction of the two streams is opposite; and there is consequently an obstructing of the secondary air inlet. Under these conditions, incomplete combustion will ensue; and the result of Professor Lewes's experiments is of no importance in solving the question whether combustible gases escape under the influence of cooled surfaces from a flame with unobstructed supply of secondary air. Perhaps the defect in Professor Lewes's arrangement explains why the composition of his spent gas does not harmonize with the usual composition of coal gas. The method of fractional combustion, which Professor Lewes trusts—from the fact that a mixture of methane, hydrogen, and carbonic oxide which he submitted to it furnished weights of carbonic acid and aqueous vapour agreeing with the volumetric analysis—is not above suspicion, as will be seen later.

Slaby, in his calorimetric investigations on the gas-engine, viewing his subject from a mechanical more than a chemical standpoint, has evaded rather than answered the question of

* See "Journal" Vol. LVII., p. 693.

the combustion of gas in gas motors. He gives seven analyses (made volumetrically) of exhaust gases, in all of which carbonic oxide was absent, though traces were found in later determinations. He assumes throughout that the total heating power of the gas is efficacious in the motor. This assumption is quite justified—as will appear later—for charges rich in gas (1 of gas to 5·9—6·7 of air) such as Slaby used, though the contrary would be deduced from the analyses quoted by him. Thus the coal gas he used contained 29 per cent. of methane; and the mixture of 1 of gas to 6 of air would, therefore, have 4·1 per cent. of methane. Of this, 0·6 to 1·8 per cent. was found unburnt, according to the analyses; or 15 to 44 per cent. of the methane of the gas—indicating that only 80 to 90 per cent. of the heat of combustion of the coal gas was efficacious in the motor. Slaby compares the results of the analyses of the exhaust gas with its composition as calculated from the analysis of the coal gas, and gives the following figures:—

	Composition of Exhaust Gases.		
	Calculated.		Found (Average).
Carbon dioxide	9·2	..	9·0
Oxygen	4·8	..	3·3
Nitrogen	86·0	..	87·0

The deficiency of oxygen, Slaby attributes to combustion of the lubricating oil. This conclusion is erroneous; for the complete combustion of lubricating oil, as well as of coal gas, yields—besides traces of sulphurous and sulphuric acids—only carbonic acid and aqueous vapour; and such combustibles obey the law that the amount of oxygen for a constant amount of carbonic acid in their gaseous products of combustion is greater as the proportion of carbon to available hydrogen in the combustible is greater. By available hydrogen is meant that which remains when double the volume (or one-eighth the weight) of the combined oxygen is deducted from the total amount of hydrogen in the combustible. Dr. Bunte has found, diagrammatically, that the line representing the geometrical locus of all sums of carbonic acid and oxygen which may occur by dilution of the theoretical gaseous products of combustion with excess of air, gives, for a constant percentage of carbonic acid, a lower value with coal gas than with lubricating oils. Therefore the more oil is burnt, the greater is the amount of oxygen for a constant percentage of carbonic acid in the products of combustion. It is immaterial whether the oil be vegetable or mineral, as the ratio between carbon and available hydrogen is nearly the same for either kind.

The description of the experiments made to elucidate these questions may be divided into four sections—viz.: 1. The experimental devices for the analysis of the products of combustion. 2. Experiments for ascertaining the conditions under which the combustible constituents of spent gases may be fractionally burnt. 3. The examination of the gases of combustion in heating flames. 4. The examination of the exhaust gases in gas motors. The third and fourth sections are further divided into five sub-sections: (a) The collection of the gas; (b) the complete combustion of the combustible constituents of this gas; (c) qualitative investigation of the nature of the combustible constituents; (d) their separation quantitatively; and (e) summary of the inferences drawn from the results.

I.—*The Plan adopted for the Analytical Tests.*

The combustible constituents in the gases to be examined did not amount in the worst cases to 1 per cent. Therefore volumetric analysis was not suitable, and gravimetric methods were preferred as being more exact. The following plan suggested itself: (1) Removal of the aqueous vapour; (2) removal of the carbonic acid; (3) conversion of the readily combustible constituents into carbonic acid and water; (4) removal of the aqueous vapour so formed; (5) removal of the carbonic acid so formed; (6) conversion of the difficultly combustible constituents into carbonic acid and water; (7) removal of the aqueous vapour so formed; and (8) removal of the carbonic acid so formed. Nos. 3, 4, and 5 can be combined with 6, 7, and 8 if complete, instead of fractional, combustion be carried out.

The acetylene may be estimated as the silver compound by an absorption method instead of by combustion with the other combustible constituents. This determination for practical reasons would be carried out apart from the large combustion estimation. The separation of the aqueous vapour entailed also the removal of finely divided liquid constituents from the gas. Such atomized liquid constituents are always present in the spent gas from gas-engines, and probably caused the erroneous results given by Slaby. They arise from the lubricating oil; but they may be formed from the gas under certain conditions (which will be discussed later), when the combustion occurs near cold surfaces.

For the absorption of the aqueous vapour and the liquid particles from the spent gas, it was first led through a calcium chloride tube; and then through a Winkler's absorption apparatus, charged with concentrated sulphuric acid. The whole of the liquid constituents were retained at the nozzle which is inserted at the first coil in the Winkler's apparatus, and dissolved in the sulphuric acid, causing a red colouration of it. The gas subsequently passed through a tube containing powdered phosphorus pentoxide. It was thus completely dried before it reached the carbonic acid absorption apparatus, which consisted of a Geissler's apparatus charged with solution of caustic potash, followed by a V tube filled with soda-lime. To this was attached a Geissler's apparatus charged with concentrated sulphuric acid. This was followed by a small tube containing phosphorus pentoxide. The whole of the carbonic acid was thus separated. Baryta water in a vessel attached to the last tube of this train of apparatus showed no turbidity when the gas had passed through it for hours. After each of the two combustion contrivances was a Geissler's bulb apparatus with solution of caustic potash [? concentrated sulphuric acid—TRANSLATOR]; and a small tube of phosphorus pentoxide attached, and then the train of three pieces above described for the absorption of carbonic acid. Each of the carbonic acid absorption apparatus was weighed, as were also the two water absorption appliances which followed the combustion contrivances.

The weight of the first drying apparatus was not ascertained; for though correct figures had been obtained with some difficulty for the amount of water in the spent gas, the determination was not of importance, as the weight of aqueous vapour could be deduced from the known composition of the coal gas, and the weighed amount of carbonic acid in the spent gas. The three carbonic acid and two water weighings for each test, were thus applied: The ratio of the sum of all three carbonic acid weighings to the sum of the weights of the carbonic acid after the combustion apparatus was calculated. This ratio is a measure of the completeness of the combustion in the process under trial; and it is therefore specified later in the summaries as the degree of incompleteness. Next, from the weights after the combustion apparatus the ratio of the atoms C to H is deduced, both for the two groups separately and for the added weights of carbonic acid and water. This ratio permits several conclusions to be drawn. $C : H = 1 : <1$ proves the presence of carbonic oxide; $C : H = 1 : >4$, the presence of free hydrogen. Further conclusions are explained and drawn later.

Besides the apparatus for weighing the carbonic acid and water already described, there is also a large collecting vessel for measuring the volume of the spent gas to be examined. This will be referred to again when sampling the gas is described. There was also before the apparatus a T piece, by which samples of the gas passing could be taken in a Bunte burette for the volumetric determination of the carbonic acid. The apparatus was tested, before each experiment, under a vacuum and pressure of 80 inches of water; and the rate of flow of gas in the combustion apparatus was kept well below 3 c.c. per second. At this rate, absorption was quite complete. Various kinds of apparatus were used for the combustion of small quantities of gas. At first a short combustion tube filled with copper oxide, and drawn out at the ends, was used. A high heat is needed to burn small quantities of methane with certainty. A flat-flame bunsen burner with oblong chimney was tried; but it soon rendered the tube useless. The latter was protected with a fire-brick casing; but a much stronger flame was then needed to give sufficient heat to the tube. For convenience, therefore, the copper oxide tube was replaced by a Drehschmidt's platinum capillary, provided with Winkler's cool end-pieces. But when this was raised to a white heat in the upper part of the flame, and carefully kept from the green reducing zone, it was not any more satisfactory. The fractional combustion experiments demanded great accuracy; and the capillary allowed small but weighable quantities of the gases of the flame—carbonic oxide and hydrogen—to pass through it. So that, after several hours, the weight of carbonic acid and water collected after the tube was a little too great. An attempt was made to form an analogous apparatus with impervious walls from a porcelain tube, glazed within and without, of 2 mm. internal diameter and 1 mm. walls, by passing through it a stout platinum wire, to which platinized asbestos was bound with fine palladium wire. But the platinized asbestos rapidly became coated with soot from the rate at which the gas passed through the narrow channel; and the methane was then incompletely burnt. Therefore a wider glass combustion tube (6 mm. internal diameter), filled for a length of 30 cm. with platinized asbestos, and wrapped in thin sheet asbestos, was heated in a short combustion furnace to incipient whiteness. This tube answered well. The glass softened at about 750° C. According to Philipps, methane is burnt over platinized asbestos at 404° to 414° C. Therefore all combustible constituents were completely separated quantitatively. For ascertaining the margin of error in the determinations, several blank tests were made, by drawing air through the apparatus in the manner described for the complete burning of a combustible gas.

(To be continued.)

The Flash-Point of Mineral Oil was the subject of a paper read by Mr. D. R. Steuart at the meeting of the Scottish Section of the Society of Chemical Industry last Tuesday. He discussed the relation between the Abel test and the point at which oil would explode in a lamp, or catch fire if spilled; and he gave the results of a long series of experiments he had made. As a demonstrated scientific fact, with some oils, at any rate, there was danger of severe explosion in a lamp even at its Abel flash-point; and at a very few degrees above it, he often found explosion very severe. Their "special pleaders" all dilated on the extreme fewness of lamp explosions; and they put all the blame on lamps upset or broken. If a lamp were overset or broken with oil flashing above 100° Fahr., there were a thousand chances to one the flame would go out without doing harm.

FURTHER INVESTIGATIONS WITH RÖNTGEN'S RAYS.

Physicists of all nations are busying themselves with the Röntgen rays, the nature of which is still the subject of dispute. Some use of the Röntgen method has been made in surgery; but most of the experiments that have been carried on in this way are exploratory. The best results seem to have been attained by the use of apparatus improved by Messrs. Newton and Co., of London, who have hit upon an arrangement by which the X-rays are apparently brought to a focus, with the effect of rendering the resultant image much sharper, while the length of the necessary exposure is greatly diminished. Mr. A. A. C. Swinton, who was the first to work upon these rays in this country, claims to have actually *seen* by this agency coins inside a leather purse, metal instruments in a wood and leather case, coins through pieces of wood and sheets of aluminium, and lastly the bones in the thick portion of his own hand. Mr. Swinton's method was described in "Nature" for the 25th ult. His apparatus consisted of a tube of opaque pasteboard with a simple aperture at one end, to which the eye was applied. At the other end there was an opaque diaphragm of double black paper, upon which, on the inner side, was laid a piece of blotting-paper impregnated with platino-cyanide of barium in the crystalline state. The object was held against the diaphragm with the Crookes tube beyond it, so that the rays of the latter cast a shadow of the coins through the black paper upon the inner impregnated screen. The platino-cyanide fluoresced highly under the influence of the rays on those portions of the blotting-paper where no shadow was cast; and consequently the form of the shadowing object was rendered visible.

M. Maurice Meslans observes, in a communication to the French Academy, that he has set himself to examine the relation that exists between the transparency of substances to the X-rays and their chemical nature. So far he has ascertained that the transparency or opacity of bodies to these rays is not absolute, but is affected by several characters, among which specific chemical nature appears to be numbered. Thus it has been established that carbon in all its forms is extremely transparent to the rays. Such different forms, to ordinary appearance, as diamond, graphite, anthracite, and sugar charcoal, act like wood or paraffin of equal thickness. M. Meslans thinks the reason why animal flesh is more permeable by the rays than bone is because the muscles are substances formed entirely of carbon, hydrogen, oxygen, and nitrogen; while it is the mineral elements that give the bones their comparative opacity. Other observers testify to retort coke being more transparent to the rays than ivory.

As the hand appears to feel a sensation of cold when exposed to the X-rays, Mr. Dawson Turner tested the matter with a thermopile, which showed that heat was being radiated from the phosphorescent patch in the Crookes tube. On replacing the thermopile by a lighted candle, the flame exhibited a flickering motion, and was slightly drawn towards the phosphorescent patch. A flame is almost transparent to the X-rays. On taking a shadowgraph of a lighted candle or gas-jet, the shadow of the flame is just visible as an exceedingly faint impression; the internal core in the case of the gas-flame being slightly more marked than the external. It does not appear from this statement as if the investigation of flames is likely to be facilitated by the newly-discovered rays.

Professor J. J. Thomson has made the interesting discovery that, when the Röntgen rays pass through any substance, they make it for the time being a conductor of electricity, even though the substance is in the normal state a perfect insulator. This explains the observed fact that an electrified plate in air loses its charge when exposed to these rays, whether it be electrified positively or negatively. The air itself is converted into a conductor by these rays; and the charge escapes through it. Professor Thomson also thinks that the rays in question are not all of the same kind, since some of them penetrate through tinfoil more readily than others. Meanwhile, some hold that the rays are cathodic; others, that they are anodic; while Dr. Mau, an American experimenter, finds something like them in sunlight—he having succeeded in obtaining a photograph of a key, covered by a board, by five hours' exposure to the direct rays of the sun.

THE AIR-COMPRESSING PLANT AT THE BRADFORD ROAD GAS-WORKS, MANCHESTER.

It will be remembered that, at the recent annual meeting of the Manchester District Institution of Gas Engineers, the members visited the Bradford Road Gas-Works of the Manchester Corporation, where they had an opportunity of inspecting the large installation of stoking machinery which has been supplied by West's Gas Improvement Company, Limited. This machinery was described generally in the "JOURNAL" on the occasion of the visit of the Gas Committee to the station about two years ago; but it may be of interest to supplement the particulars then given by others relating to the air-compressing plant employed for working both the drawing and charging machines.

Beginning with the air-compressor, this is fixed in a building at the end of the coal-stores. It has many special features, and embodies every improvement that could be devised for compressing air with the smallest possible expenditure of steam. It is arranged as a horizontal side-by-side compound steam-engine (the cylinders being 12 in. by 24 in. and 21 in. by 24 in.), provided with a fly-wheel on the crank-shaft between the two engines. The low-pressure air-cylinder is placed tandem with the low-pressure steam-cylinder; the piston-rod of the latter being carried through the back cover to the piston of the air-cylinder. The high-pressure cylinders are similarly arranged. Each steam-cylinder is fitted with Meyer expansion slide-valves; and each air-cylinder, with delivery-valves, which are lifted and lowered by cams on a way-shaft, though they are free to lift automatically to suit variations in the receiver-pressure, if it should happen to fall below the intended working pressure. The suction-valves are of the ordinary mush-room-type, kept to their seats by light spiral springs. The air-cylinders are provided with water-jackets, as well as with an intermediate tubular cooler, which is placed between the low and high pressure cylinders, and through which all the air passes on its way from one cylinder to the other. Each air-cylinder is provided with bye-pass grooves at either end of the stroke; and in this way the detrimental effects of clearance are almost entirely overcome. This arrangement has a twofold advantage. The high-pressure air entrapped in the clearance space at the end of the stroke is transferred from where it is detrimental to where the pressure is required—*i.e.*, on the compressing side of the piston; thus ensuring a larger volume of air being taken in and delivered than would otherwise be the case. In the ordinary compressor, in which such an arrangement is not adopted, it is necessary to work with an extremely small margin between the piston and the cover, in order to reduce the clearance space. This, of course, necessitates great care in adjusting for the wear of the connecting-rod brasses—requiring the constant attention of careful and experienced drivers; whereas with the present arrangement the compressor can be left in the hands of an ordinary engineman.

After the air is compressed, it is delivered into two cylindrical receivers, in which it is stored. These are provided with all the necessary inlet and outlet connections and safety-valves. The air is conveyed from the receivers by iron pipes to the hose drums fitted to the girders carrying the overhead coal-hoppers for supplying the charging-machines. There is a large hose drum, complete with all fittings, for each of the charging and drawing machines. A long length of flexible hose is attached at one end to each of these drums, and at the other to the machine supplied from it. Each drum is provided with a hollow shaft through which the air is supplied; and, by an arrangement of gun-metal swivel joints, the air is fed to the hose on the drums while they revolve. On each of the hose-drum shafts a chain drum is keyed. A chain attached to this leads over pulleys fixed in the retort-house roof, having weights at the other end which rise and fall as the hose is automatically paid out and in by the machines. The hose leading from the drums of the machine is specially constructed for conveying air; and is supported at intervals by suspending brackets and rollers, so that the strain upon it is very slight. The supply of air to the machine does not require any attention by the man operating it; while a further advantage of the system is that the exhaust air assists in ventilating the retort-house.

The air-compressor has been submitted to a series of tests by Mr. J. Goodman, Assoc.M.Inst.C.E., M.Inst.Mech.E., Professor of Engineering at the Yorkshire College, Leeds. One of these was made at the South Metropolitan Gas-Works, after the engine had been running continuously, night and day, for two months. In this case, the only measurement made was the indicated horse power; the object being to ascertain how the compressor was performing its every-day work. The results were highly satisfactory. The valves were acting perfectly; the mechanical efficiency was 80·3 per cent.; the compression efficiency, 82·1 per cent.; and the delivery of air, 369·3 cubic feet per indicated horse power per hour. Professor Goodman considers that the compressor does remarkably good duty; and he places it high for economy and general excellence.

Sulphate of Ammonia v. Nitrate of Soda.—The South-Eastern Agricultural College have issued a circular to farmers, pointing out the very low price to which sulphate of ammonia has fallen—viz., £8 17s. 6d. per ton on rail in London—as compared with nitrate of soda at £7 12s. 6d. per ton. The circular states that since both manures are valuable only for the nitrogen they contain, and as, roughly speaking, sulphate of ammonia costing £6 13s. 1½d. contains 20 per cent. of nitrogen, and nitrate of soda only 15 per cent., three-quarters of a ton of sulphate has in it as much food for a crop as a ton of nitrate. Of course, it is true that the nitrogen in the nitrate is accepted as being more effective than the nitrogen in the sulphate; but, at the outside, the difference in manurial power is certainly not more than 10 per cent.—thus leaving a substantial margin of cheapness in favour of sulphate. When it is also remembered that the more concentrated nature of sulphate means a saving of 25 per cent. on the carriage, and that it can often be bought at still lower rates from local gas-works, it is clear that, for any other than very light sandy soils, sulphate rather than nitrate should be bought at present.

GAS AND OIL ENGINES.

The third of the special lectures on the above subject which Professor W. H. Watkinson has been giving at the Glasgow Technical College (see *ante*, p. 336) was delivered on Feb. 20, and was well attended.

The lecturer began by giving a rather full description of the Atkinson, Tangye, Burt, and Crossley engines; and he specially enlarged on the Crossley-Atkinson "scavenging" engine, the advantages and disadvantages of which he stated at considerable length. He also devoted some remarks to the benefits arising from the maintenance of constant thrust in the case of high-speed gas-engines, especially when they are to be used for the direct driving of dynamos; and he illustrated his remarks on this part of his subject by reference to the two engines in course of construction by Messrs. Burt and Co. for the Belfast Corporation electric light station. These engines are of the twin-tandem vertical type; resembling in some respects the noted Willans steam-engine. The advantages of great expansion on the efficiency of gas-engines were pointed out; and it was explained how this increased expansion might be obtained by slight modifications in ordinary gas-engines. Explanations were likewise given as to the methods whereby gaseous mixtures too dilute for ignition under ordinary conditions might be burned successfully by increasing the temperature and pressure prior to ignition. Equations were then put on the blackboard showing the efficiencies of engines working with different cycles, under ideal conditions; and the lecturer specially directed attention to the fact that with the Otto cycle the efficiency was independent of the maximum temperature, and depended almost solely on the amount of initial compression. One of the cycles described gave, under ideal conditions, an efficiency of 70 per cent.; and as 60 per cent. of this might be realized in actual practice, the adoption of that cycle would at once raise the efficiency of the gas-engine to upwards of 40 per cent. Next in order the principles of design of gas-engines were dealt with; and, in conclusion, an actual case was worked out on the blackboard.

Questions were then invited by the Chairman (ex-Bailie Crawford) from any of the audience who might have failed to understand all the principles enunciated. Mr. Murray asked for a fuller explanation of the reason why expansion, even below atmospheric pressure, would lead to increased efficiency. The lecturer showed by means of an indicator diagram that, as the expansion line was above the compression line, when compressing back to atmospheric pressure prior to the opening of the exhaust-valves, useful work could be obtained in that way; the compression line being lower than the expansion line on account of the products which were formed during this part of the operation. Other questions were asked; but they were not of the same importance as Mr. Murray's.

The concluding lecture was delivered on the 27th ult.

In the first place, Professor Watkinson dealt with crank-effort diagrams, especially referring to those of ordinary, tandem, and double-acting engines. He also spoke of constant thrust, as illustrated by the "Acme" engine. He next made some remarks in reference to the Lenoir engine diagram. Speaking of the loss of energy due to the charge expanding prior to the compression stage, he referred to Hartley's diagram, and remarked that a similar loss occurred in oil-engines where the governing was done by the exhaust-valve. He gave some consideration to the effect exerted by pressure and temperature on the inflammability of gaseous mixtures, which rose in efficiency with increase in compression, partly due to the more dilute mixtures which might be used. At ordinary atmospheric pressure and temperature, mixtures of gas and air would not ignite explosively, if at all, when the air amounted to about fourteen times the bulk of a given quantity of gas; and similarly, he said, the mixtures would not ignite explosively if too much gas were present. If a red-hot poker were introduced into mixtures of either of the kinds referred to, combustion might take place in the layer of the gaseous mixture immediately next to it; but the rest would not be ignited. The explanation of this phenomenon given by the lecturer was that the heat generated by the combustion of a mixture having an excess of either air or gas was not sufficient to raise the temperature high enough for the combustion to be continued; the temperature required being probably not less than 1000° Fahr. Increase of pressure certainly raised the inflammability of gaseous mixtures having a combustible gas as one of their ingredients. Professor Watkinson went on to state that the fact of increase of temperature or of pressure, or both, heightening the inflammability of such mixtures was the key to one of the reasons why increase of compression led to an augmentation of the efficiency of a gas-engine. A more dilute mixture could be successfully burned in an engine; and as the efficiency of engines having the Otto cycle was independent of the maximum temperature, it was evident that the efficiency of that cycle could be still further increased by the possibility of more dilute mixtures being used. The lecturer subsequently spoke of the effect of shape and size of compression spaces in gas-engines and of late ignition; and he then dwelt at some length on the forms of indicator diagrams from such engines.

Some consideration was next given to gas-producers of various kinds, and to the principles underlying the whole of them. He remarked that Dowson was the first to obtain a gas suitable for gas-engines, and to secure continuous working; and he proceeded to give a full description of the "Dowson" producer. In the course of his remarks upon it, he said it was necessary that the temperature of the producer should be well maintained, otherwise there would be tarry products which would interfere with its successful operation. One pound of steam was required for a similar quantity of anthracite. The Professor passed on to speak of the relative calorific values and cost of ordinary coal gas and "Dowson" gas; and he remarked that, for the complete combustion of the last-named fuel, one volume required one to one-and-a-half volumes of atmospheric air.

Oil-engines were next spoken of by the lecturer, who said that, in a sense, they only differed from gas-engines in the fact that in their structure there was also a part in which the oil was converted into vapour before it could be used. In oil-engines of some types, gasolene or petroleum spirit was used; the charge of air being drawn over or through the vessel containing the liquid. In this way it took up a sufficient quantity of vapour to render the mixture explosive in the cylinder of the engine when mixed with more air. In the case of oil-engines of other types, the oil was converted into vapour or gas, which was subsequently fed into the engine proper, and used just as ordinary coal gas or producer gas was employed. The most important types of oil-engine were those in which ordinary burning oil was used; and they were fitted with special arrangements for vaporizing the oil. There were at least four different kinds of oil-engines, according as the oil was or was not first made into spray, and according to the relationship of the vaporizer to the other essential parts of the engine. Professor Watkinson then specially described four types—the Priestman engine, the Hornby-Ackroyd engine, the Crossley engine, and that brought out within the past year or two by Messrs. Bow and M'Lachlan, of Paisley. Proposals had, he said, been made to vaporize oil in jackets; the engines being thereby kept cool, as in the case of engines provided with water-jackets. But there were certain objections to this method of procedure which he briefly indicated. In speaking of the Hornby-Ackroyd engine, he said it used oil having a density ranging up to ·88 and a flash-point of 250° Fahr. There were, he said, in this engine between the oil-pump and the vaporizer, two valves which were kept closed by springs, and opened by the governor; provision being thus made for the unused oil draining back to the tanks. Referring to the Clarke-Chapman oil-engine (Butler's patent), he remarked that the oil and air were warmed by the exhaust, which was drawn into the cylinder through a conical screw-down valve; and in the cylinder the mixture of oil and air was mixed with the main supply of air for ignition and combustion, which was effected either by a tube or by an electric spark.

Subsequently the lecturer proceeded to speak on the subject of the testing of gas and oil engines. He mentioned certain rules to be followed, and worked out calculations in illustration thereof. He said that several indicator diagrams should be taken on each card, and that the mean of them should be used. In all cases, the number of missed explosions should be counted, and due consideration given to them. Regarding the mechanical efficiency of the engine being tested, it was absolutely necessary that the consumption of gas should be noted, as also its temperature and the pressure employed, which should be reduced to the standard of 32° Fahr. and 14·7 lbs. He also laid down the rule to be observed when it was desired to find the amount of heat lost to the cooling water.

In concluding his lecture, Professor Watkinson made a few remarks by way of giving advice to the Corporation Electric Lighting Committee. He said that, instead of carting the coke fuel from the gas-works to the electric lighting station, they should convert it into producer gas at the works where it was made, and convey it to the lighting station, where it should be used in driving gas-engines to run the dynamos. In a similar way, he said, sub-stations might also be worked. By far the cheapest method of transmitting energy was by gaseous fuel; and he remarked that it would probably soon be found profitable to distribute cheap producer gas made from coke for power purposes in works of many kinds where machinery was employed.

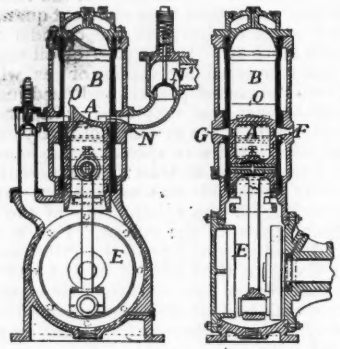
Bailie Burt, who had systematically attended all the lectures, proposed a vote of thanks to Professor Watkinson. He said that, as a maker of gas-engines, he had read every book, lecture, and paper that had come under his notice dealing with the subjects treated of in the lectures; and he was bound to confess he had gained from the latter more information regarding the science of the gas-engine than he had derived in all his reading. He expressed an ardent desire that the Professor would deal with the whole subject in a book, which he said was certain to be much in demand. Then, again, with reference to Professor Watkinson's suggestions as to the use of coke to manufacture producer gas for driving gas-engines at electric lighting stations, he was much struck with the novelty and feasibility of the notions enunciated; and he hoped that the Professor would be afforded an opportunity of delivering a public lecture on the subject, so that he (Bailie Burt) and his colleagues of the Electric Lighting Committee, as well as of the Town Council generally, might hear the matter discussed by an expert, and so that the citizens at large might become acquainted with it through the medium of the daily newspapers.

Professor Watkinson briefly acknowledged the compliment, and the proceedings closed.

REGISTER OF PATENTS.

High-Speed Gas-Engines.—Harris, H. G., of Upper Tooting, Surrey. No. 19,894; Oct. 18, 1894.

This is an improvement on Day's and Cock's patents—Nos. 6410 and 9247 of 1891 and No. 18,513 of 1892—the present inventor having found that considerable increase in the speed of running of any given engine, and reduction of the quantity of gas consumed, to secure any given power, can be obtained by making all the ports between the various parts of the engine tapering, or conoidal, in shape—that is, shaped as is the orifice known as a "Vena Contracta." In addition, an automatic non-return valve is provided, of the lightest possible description consistent with the work to be done in the exhaust passage from the power cylinder, and close to the side of that cylinder. The conoidal shape of the passages assists the speed of flow of the explosive mixture and products of combustion through or from the engine; and the valve in the exhaust prevents the possibility of "premature firing."



The engraving shows the longitudinal sections at right angles to each other of an improved engine constructed according to Cock's patent, referred to above. The position of all the inlets and outlets of the compression chamber E and power cylinder B are as proposed in that specification; and the present invention consists in arranging for the cylinder to be directly attached to the crank chamber E, which is used as a compression chamber, and wherein the gas explosion in the power cylinder B is made at every out-stroke of the piston A, and wherein there are no valves worked by cams or eccentrics or other similar contrivances, but where the actual points of admission of the air and gas, or of the explosive mixture, and of emission of the exhaust are determined entirely by the inlets and outlets being covered and uncovered by the piston in its up and down strokes, and wherein also there is provided on the piston a shield or deflector O, to direct the incoming current of the explosive mixture to the upper end of the power cylinder B. The top of the piston A, with the deflector O, is preferably made of the form shown; and the cylinder cover underneath is correspondingly formed.

The gas-inlet port G and the air-inlet port F are of tapering conoidal shape; and each may, if desired, be provided with an automatic non-return valve applied to the exhaust-port N. This exhaust-port is also made of tapering conoidal shape; and in the exhaust-pipe leading therefrom is the valve N^1, which has a spindle going through a hole in the lower part of the valve-cover, the upper end of which is screw-threaded, and has screwed thereon a piston working in a hole in the cover, and capable of being fixed in position at any desired distance from the valve. Underneath the piston, and round the valve-spindle, is a coiled spring; and above the piston is a coiled spring, kept in position by a screwed plug. The length and stiffness of the springs over all, and the amount of compression, are so adjusted that the valve is practically in equilibrium; and normally, when the engine is not working, the portion of the weight of the valve supported by its seating is small, so that a slight increase of pressure underneath the valve tends to open it. In this way, the escape of the products of combustion is not retarded, and the possibility of "premature firing" is prevented.

Safety Cut-Off for Gas-Burners.—Clamond, C., of Paris. No. 968; Jan. 15, 1895.

This invention has reference to a safety gas-burner so constructed that, when the cock or valve is opened, it will be held open by the action of the flame of the gas when ignited, but will be automatically closed when the gas is not ignited, or when (after ignition) the flame dies out for any reason—thus preventing the escape of gas and all results therefrom. The principle of the arrangement is the combination of a thermostatic element within the heating influence of the flame of the burner, with a latch for locking and unlocking the cock or valve of the burner, a friction coupling between the latch and the thermostatic element, and stops for limiting the movement of the latch.

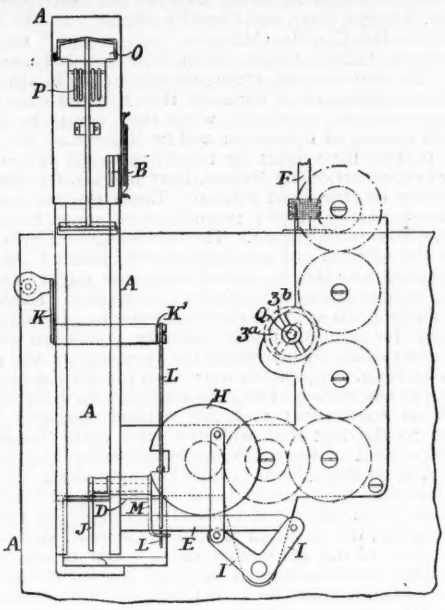
Carburetting Air and Gases.—Bullier, L. M., of Paris. No. 1953; Jan. 28, 1895.

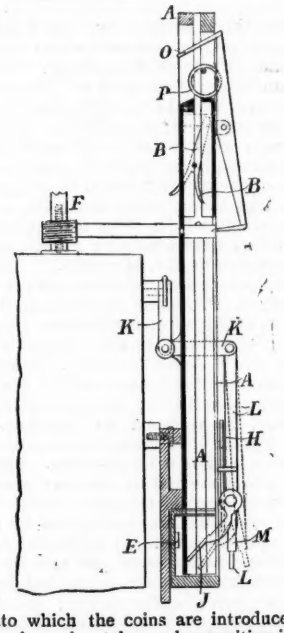
The claim for this invention is for "the admixture of acetylene with gases generally, for imparting or increasing illuminating power." The patentee says this is to be done "substantially as specified;" but no special means are described for the purpose, nor is any suggested form of apparatus shown. The patentee remarks that the proportion of acetylene gas to be mixed with water gas or other gases would need to vary according to their illuminating power and the luminous intensity it is desired to obtain. Paris lighting gas (for example), he says, possesses an illuminating power of 1 carcel—about 9 candles—per 145 litres burnt in a batswing burner; and this illuminating power is raised to 2 carcels by the addition of 7 litres of acetylene gas.

Coin-Freed Gas-Meters.—Beechey, C. G., of Liverpool. No. 5452; March 15, 1895.

This invention has reference more particularly to coin-freed gas-meters; but it is also applicable in part to other apparatus "where a coin or the like placed in the apparatus frees it, and allows it to act or be operated, or sets it in action."

The illustrations show front and side sectional elevations of the special parts of a gas-meter covered by this invention.





A is the tube into which the coins are introduced. It is so constructed that successive coins take such a position in relation to each other, that the adjacent coins in the tube cross each other, and rest one upon the other, and therefore can never jamb or stick. The means by which successive coins are caused to take these relative positions in the tube is a switch B, hinged just inside the conduit at the upper part; while the tube itself at this part is provided with two central webs, which guide and hold the coins in their vertical diameter. A slight spring is connected to the point of the switch B, and exerts a pressure which tends to retain it in the position to which it is moved by the action of each coin inserted. Below the switch there is a rail at either side of the tube, forming a channel; and the groove at one side into which the coin falls will be the opposite one to that which receives the other edge at the other side. The action is that, when a coin is introduced into the slot at the upper end of A, it passes into the switch portion of the tube; and, in falling down between the ribs, one edge comes in contact with the upper half of the switch; and the coin is thus turned about its vertical diameter, and takes a position across the angles of the tube. The weight of the coin in passing down presses the tail of the switch away from that side of the conduit across which it stands; and leaving the switch part of the tube in this transverse position, enters the grooves below at the opposite angle of the tube, and being thus held, passes in this manner throughout the rest of the apparatus. The switch B having thus been reversed by the action of the coin, the next coin introduced will have its edge pressed to the opposite side; and thereby the reverse transverse position will be given it to that of the preceding one. Its edges will therefore pass into the other two grooves, and, if the former coin be still in the tube, will rest upon its edge, but in a position intersecting that of the coin below.

The means by which the coins are removed from the tube A, and discharged into the coin-drawer (not shown) are operated from a suitable part of the meter by the action of the passing gas. It is disposed at the lower part of the tube A, and consists of a reciprocating double sliding trap, having an upper and a lower door. The trap is moved by the connecting-rod E to and fro laterally across the tube A. When one door stands across, and forms a sliding bottom to the tube, the other door stands away from the lower end of the tube, and *vice versa*. Thus (assuming there are a number of coins in the tube one upon another) when the slide-bar E moved by the meter withdraws the trap, so as to bring the upper door out of the tube, a coin would fall from the tube on to the lower door, but the upper ones would still be carried by this lower penny. Then, as the meter worked on and moved back the trap, the top door would slide in between the two coins, and support those above, while the lower door, when this is done, would be moved back so far as to allow the coin in the part of the tube between the doors to fall out into the coin-drawer.

The connecting-rod E, by which the trap is moved to and fro, is operated from the shaft F, which ordinarily actuates the counter mechanism of the meter; and this, through the worm thereon, and a worm-wheel gearing with it, and a train of wheels, operates a disc H on the axis of the last toothed wheel, which disc, through a connecting-rod and a bell-crank lever I, oscillates the rod E to and fro at each revolution.

The mechanism for stopping the supply of gas, when the amount paid for has been consumed, consists of a tappet J, which is actuated to free the meter by the coins as they pass into the trap portion of the tube A, while the weight of the parts connected with it (or a spring) moves it in the opposite direction when no coin is in such portion, and effects a locking action between the parts operated by it and the disc H. The mechanism within the meter is thus stopped, and also the valve by which the flow of gas through the meter is controlled. The means by which both these effects are produced consist in connecting the meter gas-valve spindle to, and working it through, the tappet J, the arms K and K^1, bar L, and arm M, which is mounted on the same spindle—as is the tappet J; and by locking the disc H by a pin on the bar L, which, when the notch in the disc H comes opposite this pin in the disc's rotation, and no coin is in the tube A or trap, falls into the gap by gravity (or by a spring), and further rotation of the disc H is stopped. In this latter action, the bar L is lifted, and the meter valve-spindle is thereby pressed in and the valve closed. By this means, both the gas supply and the acting mechanism of the meter are stopped. When the meter is empty, the trap will be in the position shown in fig. 1; and therefore the coin introduced will fall down the conduit and strike the tappet or pawl J, the action of which is that it, and the arm M, will be moved outwards, and therefore the rod L will also be moved outwards, and withdraw the pin from the disc H. Thereupon the meter is freed, and at the same time the rod L and arm K^1 are free to fall, and by their own weight (or by a spring) do fall and open the valve which controls the passage of the gas. Then when a revolution is partly made, the coin falls from the trap, and the tappet J and arm M will be moved back by the weight of the rod L, or by a spring. During the rotation of the disc H, the end of the pin on the bar L rests on its face; and as soon as the gap arrives opposite the pin, it drops into the gap, and the lever M and tappet I move into the normal position. The lower end of the bar L being then free in the hole in the end of the arm M, the disc H will rotate a certain amount, and lift the bar, and so move the arm K until it closes the gas-valve. When this is done, the disc H is held.

The tube A is provided with a switch at the upper part, by which coins of wrong size are discharged from the tube. One side of the slot is provided with an opening in which works a switch of rings P carried in a bar below. The action of this switch-device is that, when the proper sized coin is introduced, the lower edge of it, acting upon the rings, presses them back, and so the coin passes them, and falls down the tube; but when a smaller coin is introduced, the coin will not be held at its edges, and therefore the rings cause it to pass away from the slot in an outward direction, and shunt the coin out of the tube through the opening. The tube A is closed by a plate O, inclined (as shown) and supported on a hinged rocking lever, the opposite end of which is acted upon by the coins in the tube when full up to the lower edge of the bars. If, when the tube is full to this point, a coin be pressed into the slot, the plate O cannot be pressed back, as the tail of the device is stopped from being moved inwards by the presence of the uppermost coin in the tube. When, however, coins are removed from the tube, then, by pressing a coin into the slot, the edge acting upon the inclined plate O presses it back, and allows the coin to fall into the tube. By this means, no coins will be held or rest in the switch portion of the tube.

With regard to the train of wheels upon the spindle Q, there are two toothed wheels 3^a and 3^b; the latter always being in gear with a wheel of the meter of fixed size, while the former wheel is changeable, and according to the size of the wheel, the position of the spindle Q will change—a slot in the supporting plate being provided to allow of the change of position of the axis. The purpose of this wheel-changing arrangement is that, as the price of gas varies, the amount of movement of the controlling mechanism which governs the frequency of action of the trap which receives and discharges the coins must be changed.

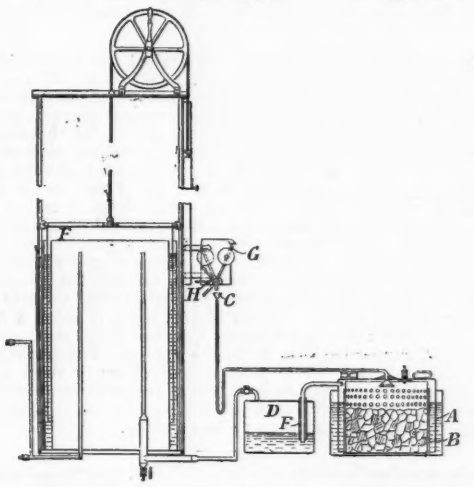
Rendering Acetylene, and other Gases Rich in Carbon, Suitable for Lighting and Heating Purposes.—Bullier, L. M., of Paris. No. 6101; March 23, 1895.

The carbides of the alkali-earth metals manufactured as described in patent No. 2820 of 1895, enable acetylene "to be produced at low cost and to be used commercially;" and the present invention relates to means by which not only acetylene, but all other gases rich in carbon may be utilized for lighting and heating purposes. Acetylene, as is well known, when burnt at the normal pressure, produces a smoky flame of red colour, due to the carbon resulting from the decomposition of the acetylene escaping unconsumed. The patentee has endeavoured to effect the due combustion of the carbon by multiplying as much as possible the points of contact of the acetylene with the oxygen of the air—by burning it in thin films emitted from burners having extremely fine slits; but burners of this kind, besides being very liable to become clogged, involve too much alteration of existing fittings to practically solve the problem. According to this invention, therefore, he obtains the desired increase of the surfaces of contact between the oxygen and the acetylene by diluting the latter with an inert gas, and burning it in this diluted condition at ordinary burners.

Acetylene may, theoretically, be diluted with air; but, in practice, such mixture presents certain dangers—explosive mixtures being formed. To avoid this danger, nitrogen is used, whereby the acetylene may be diluted to such an extent as to enable it to be applied for lighting purposes with ordinary burners. The illuminating power of the acetylene is, in fact, much greater when nitrogen is diluted with an incombustible gas than when mixed with combustible gases—the lighting power of acetylene when mixed with a combustible gas being, theoretically, inversely proportional to the quantity of heat given off by the combustion of the combustible gas. The proportions of the acetylene and of the inert gas may be varied according to circumstances, and the result to be produced; but the patentee says that a mixture which gives good results for lighting purposes consists of 50 parts of acetylene and 50 parts of nitrogen.

Generating and Storing Acetylene.—Gearing, E., of Harrogate. No. 6777; April 2, 1895.

The acetylene generator constructed according to this invention comprises an outer or main part A, resembling a gasholder, sealed by water contained within an annular receptacle B, and the surface of which is preferably covered with oil to prevent it evaporating. Within the receptacle B is a perforated basket, open at top, into which the carbide and water are fed. Water is supplied to the basket through a sprayer of sufficient size to cause the water to be discharged practically over the whole of the top of the material in the basket; the water supply being effected by a pipe whose upper end terminates in a funnel-mouth C, below an automatically controlled cock connected with the bottom of a water-tank. D is an intermediate chamber, partly filled with water, and connected by a pipe A to the upper part of the

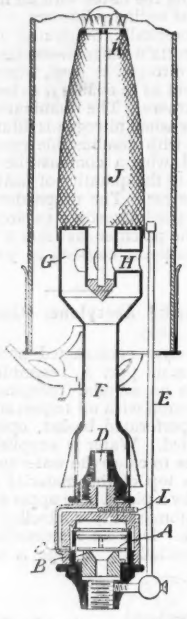


generator. The pipe at its free end is arranged to slide easily in a vertical water-sealed pipe E, so that it will conduct acetylene from the generator into the intermediate chamber D and through the water therein, and thus the return of the gas to the generator will be prevented. A pipe connects the upper part of the chamber D with the interior of the storeholder, and conducts the gas thereto. The holder comprises a moveable bell F, sealed at its lower end by water, contained within a stationary annular receptacle. One end of a wire rope or chain passes over a grooved pulley, carried by brackets secured to the framework of the holder, and is connected to the moveable portion of the holder. To the other end of the rope is attached a weight, having a laterally projecting portion formed with projections, as shown. Suitable guides are provided, to ensure that the weight shall move vertically during the rise or fall of the holder. To the spindle of the water-cock is connected a lever, of which one arm G is weighted, and the other H formed with a notch—making the arm of bifurcated form, in which the projecting portion can work. The relative arrangement of the parts is such that, when the bell of the holder has been raised by the gas within it nearly to its highest position, the projecting portion of the weight will act upon the lower part of the notched arm, and thereby turn the spindle of the water-cock to which it is fixed, and cut off the supply of water to the generator, so as to stop the generation of gas. As the gas is drawn off from the holder, and the pressure is consequently reduced, the holder descends, thereby raising the weight with the projecting portion, which then acts upon the upper part of the arm H, and moves the lever in the reverse direction, so as to open the cock and cause the supply of water to the generator to be renewed, and the generation of gas to again commence.

Incandescent Gas-Burners.—Sugg, D. W., of 79, Queen Victoria Street, E.C. No. 6870; April 3, 1895.

The object of this invention is "to overcome the difficulties hitherto inherent in incandescent gas lighting—namely, (1) the deposition of carbon on the mantle and other parts; (2) the fracture of the mantle at the neck; and (3) the liability of the glass chimney to crack—and to produce, in addition, an automatic cut-off in combination with a pilot light, whereby the use of special taps or cocks for the burner and the pilot light, when a pilot light is employed, are dispensed with." In his specification, the patentee remarks that the deposition of the carbon may be said to arise principally from the want of oxygen to the centre of the flame, and the fracture of the mantle and the cracking of the glass are practically caused by the lack of a proper exit at the top

of the mantle for the products of combustion, which are thus deflected outwards, through the upper part of the mantle, on to the chimney—thus cracking the chimney, and destroying the mantle.



A disc or diaphragm valve A rests on a raised seat B, contained in a chamber situated in a casing, with a threaded socket for attachment to the fitting. In the casing is a side gas-way C, from the chamber below the valve to a central hollow peg or stump D above the chamber. There is also a relief air-passage from the top of the chamber to the outside of the casing, near the central stump, to relieve the pressure on the top of the valve. From a point in the threaded socket below the valve-seat B, there is carried up to the top of the burner a small tube E for the pilot light. The gas issues from D into a mixing chamber F, which is provided with suitable lateral openings, so as to form a burner of the bunsen type, and also a guard which extends downwards beyond the openings. This mixing chamber terminates in an annular burner G, of the argand type, through the lower part of which tubes H are inserted (preferably radial), so that air may pass to the centre of the burner. In the central space is fitted a plug, in which is inserted a central rod or peg J, which carries at its upper end a perforated supporting disc K for the mantle. The disc may be of any suitable material, but is preferably of woven or sheet asbestos, steeped in a fireproof solution, and having perforations of such a size that the products of combustion will readily pass out, instead of being deflected through the mantle on to the chimney.

Incandescent Gas-Burner.—Mackenzie, J. W.; a communication from F. de Mare, of Paris. No. 7481; April 11, 1895.

This is a modification of the burner described in patent No. 10,497 of 1894; the object attained being to dispense with the glass chimney round the radiant tissue. The present burner is arranged so that the current of gas draws air sufficient to ensure its complete combustion, and the mixture of air and gas is delivered at a relatively high pressure, "so as to permit the concentration of the flame, whilst ensuring complete combustion and high temperature."

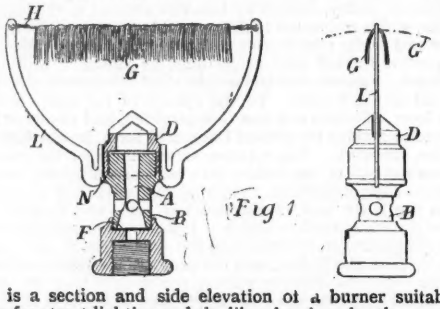
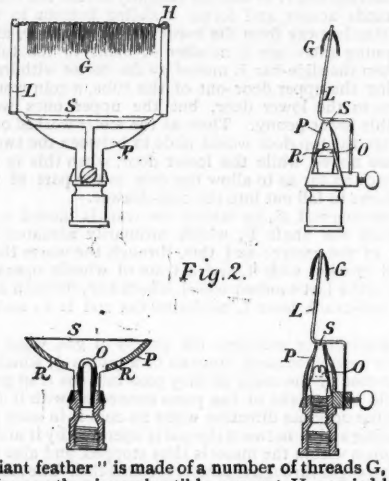


Fig. 1 is a section and side elevation of a burner suitable more especially for street lighting and the like, showing also the arrangement of the radiant feather. Fig. 2 shows front and side elevations, and sections at right angles to one another, of a modified construction of burner, suitable more especially for household lighting, and where absence of noise is important.

The burner shown in fig. 1 comprises a body in which are two conical holes A B, united at their smaller ends—"the throat of the burner." Below the throat are holes C for the admission of air. The gas is introduced through a small orifice, bored in a thin partition F (about one-sixth of the diameter of the throat) with a gas pressure of about 2 inches of water; but if the available pressure be less, the hole must be enlarged. For a radiant tissue of the form shown in fig 1, the burner is completed with a tip D with a transverse slit.

The burner shown in fig. 2 is suitable for low pressures of gas. It is arranged so that, if the feather or tissue is broken, the burner can be used as an ordinary one by unscrewing the attachment. This consists of a gas-inlet nipple O, spreading the gas out in a thin sheet, and an attachment forming an air chamber P, open below at the place where the nipple passes. It has air-inlets R; and at the top a straight narrow slit S. The chamber tapers in cross section. The whole of the air chamber P is preferably moulded in steatite or clay, and is provided with a ring adapted to pass over the gas-inlet nipple O, and fit on its body.



The "radiant feather" is made of a number of threads G, tied on to a platinum wire or other incombustible support H, carried by means of branches or arms L, projecting from a collar or ring M adapted to be seated on the burner with the support in the same plane as the slit of the nipple. Projections N on the ring, taking into notches on the body of the burner, ensure the correct position of the feather. The dotted lines in fig. 2 show the position of the threads before being calcined.

The tissue or feather is manufactured by dipping suitable threads into a solution, consisting preferably of one part of sulphate of magnesium, two parts of sulphate of erbium, and two parts of sulphate of zirconium in twenty-five parts of water. Nitrates may be employed in lieu of the sulphates. The threads are secured separately to the platinum wire; then dipped; dried at about 60° C.; and, the wire having been mounted on its carrier, the threads are then combed out straight, and may be dipped in a light varnish or collodion, to ensure retention of the proper shape.

APPLICATIONS FOR LETTERS PATENT.

3566.—Winkler, H., "Igniting devices for incandescent lighting by gas, spirit, or 'petrol.'" Feb. 17.

3641.—Welch, W., "Gas-burners and appliances for heating, lighting, and ventilating purposes." Feb. 18.

3681.—Mackean, W., and The Incandescent Gas-Light Company, Limited, "Mantles for incandescent gas lighting." Feb. 18.

3759.—Macfie, D., "Globes and chimneys for incandescent gas lighting, and for like use." Feb. 19.

3774.—Bowles, A. E., "Adaptable gas-tube for the regulation of the consumption of gas." Feb. 19.

3781.—Young, R. E., "Taps or cocks for gas-fittings." Feb. 19.

3832.—Casley, W. H., and Woodman, A. F., "Oil, gas, steam, or other motors." Feb. 20.

3860.—Graham, W. W., "Gas and oil stoves." Feb. 20.

3930.—Blackie, D., "Coin prepayment mechanism for gas-meters." Feb. 21.

3931.—Ingram, A., "The 'Burgonet' gas-controller." Feb. 21.

3937.—Rockliffe, W., "Producing artificial light." Feb. 21.

3982.—Shaw, E. J., "Incandescent gas lamps or burners." Feb. 21.

4000.—Nicholls, W., "Incandescence bodies for illuminating purposes." Feb. 21.

4153.—Bromhead, S. S., "Double-expansion gas-engine." A communication from Alexandrine Niel. Feb. 24.

4170.—Kirk, T., and Johnson, A. G., "Regulating the flow of gas and other fluids." Feb. 25.

4181.—Redman, J., "Gas-burners." Feb. 25.

4183-4.—Rowbotham, W., "Gas and like engines, and mixing and volatilizing the gases therein." Feb. 25.

4192.—Morgan, A., "Gas heating and lighting." Feb. 25.

4240.—Glover, R. T. and J. G., "Operating recording or enumerating mechanism, applicable to coin-freed gas-meters." Feb. 25.

4245.—Holt, H. P., "Gas or oil traction cars." Feb. 25.

4285.—Wigham, J. R., "Burning acetylene or other very rich hydrocarbon gas." Feb. 26.

4294.—Bilton, H. J. I., and Timmins, T., "Machine for scraping water and other pipes." Feb. 26.

4306.—Chidley, S. H., "An alarm to be applied to prepayment gas-meters. Feb. 26.

4314.—Moore, F., "Gas-meters." Feb. 26.

4345.—Dunn, J. H., and Dalrymple, R. G. E., "Production of gas by means of electricity." Feb. 26.

4394.—Bamberg, G., "Incandescent gas-lamps." Feb. 27.

4402.—Kirkwood, W. B., "Lamp for generating and consuming acetylene gas." Feb. 27.

4419.—Hanauer, J. C., "Making and carburetting hydrogen gas." Feb. 27.

4421.—Anderson, J., "Shield for an incandescent gas-mantle." A communication from W. Anderson. Feb. 27.

4471.—Hall, J. C., Dance, H. C. A., and Hall, A. R., "Manufacture of acetylene gas." Feb. 28.

4486.—Ditmar, G., "Annular liquid-combustible burner for incandescent light." Feb. 28.

4521.—Naylor, W., "Cylinder jackets of gas, oil, and similar engines or motors." Feb. 28.

4548.—Stedman, F. J., "Production of oxygen gas." Feb. 29.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Dangers of Acetylene Gas.

SIR,—My attention has been drawn to your report of the acetylene explosion in Huddersfield, which appeared in your issue of the 25th ult. I am not in possession of any fuller details than your report contains; but I should like to point out that the presence of the gas-pendant near was not necessary for determining the explosion.

As this gas is being experimented with for lighting purposes, it cannot be too widely known that acetylene forms with various metals—notably copper—compounds which explode violently when excited by the slightest friction. So that, unless it be iron or steel, metallic connections or moveable fittings should be avoided, where they will come in contact with the gas. This precaution is especially necessary about the generator, where the gas is in a very moist state.

Southport, March 3, 1896. S. J. ELLIOTT.

The Recent Accident to a Gasholder at Gothenburg.

SIR,—I observe in your issue of Jan. 7 a report on an accident to a gasholder, which was destroyed at Gothenburg, Sweden. It seems the capacity of the holder was 460,000 cubic feet, and consisted of two lifts, respectively of 126 ft. and 123 ft. 4 in. diameter. It had tilted to the extent of 16 inches; but the rollers were then nicely adjusted to give not more than $1\frac{3}{16}$ inches play radially. As we have a holder of similar capacity, I should be glad if the following questions, which are of special importance, could be answered:—

1.—What was the breadth and depth of the cup?
2.—Are there guide-wheels attached to the inner lift, and rollers to the outer lift, and what are their sizes?
3.—What was the depth of the groove in which the wheels or rollers ran?
4.—When it is said that the rollers got a play radially of $1\frac{3}{16}$ inches, does this mean each roller?
5.—What was the "play" before the tilting?
6.—How many columns are there to which are attached the guide-rails or grooves?
7.—Were the guide-rollers adjusted when gas was entering the holder, or was the holder at the cupping, or how many plates of gas?
8.—Were the guide-rails tested for vertical adjustment?
9.—Was there any adjustment of the balancing of the bell of the holder?
10.—What were the sizes of the plates of the inner lift?
11.—When observations were made upon the holder as to its tilting, was the gas entering it as during the day, or was the gas leaving it as at night?
12.—What were the maximum and minimum spaces between the inner lift and the cover of the cup of the outer lift—say, at six points of the circle?

I think that the working of holders in the past has had very little attention, and when a fine new holder like the one in Sweden is destroyed, every question about it is undoubtedly of special importance.

Calcutta, Jan. 30, 1896. D. COATS NIVEN.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bills referred to a Select Committee consisting of the Earl of Camperdown (Chairman), the Earl of Dartmouth, the Earl of Buckinghamshire, Lord Mendip, and Lord Wimborne; to meet on Thursday, March 12: Birmingham Corporation Water Bill, Cowes Gas Bill, Falkirk and District Water Bill.

Bill referred to a Select Committee consisting of the Earl of Lauderdale (Chairman), the Earl of Caledon, Viscount Falkland, Viscount Halifax, and Viscount Bangor; to meet on Thursday, March 12: Malvern Link Bill.

Petitions have been presented against the following Bills: Aldershot Gas and Water Bill, British Gaslight Company (Norwich) Bill, Cheltenham Gas Bill, Cowes Gas Bill, Newcastle-upon-Tyne and Gateshead Gas Bill, Redheugh Bridge Bill, Ystrad Gas and Water Bill, Ystradyfodwg Urban District Council Gas and Water Bill.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Bill presented and read the first time: District Councils (Water Supply Facilities) Bill, "to give greater facilities to District Councils to arrange with landowners for the supply of pure water to their estates."

Bills read a second time and committed: Bournemouth Gas and Water Bill, Cupar Water Provisional Order Bill, Fylde Water Bill, Guildford Gas Bill, South Metropolitan Gas Bill, Whittington Gas Bill.

Petitions against the following Bills have been presented: Lanarkshire (Middle Ward District) Water Bill, London Sea Water Supply Bill.

The Ilfracombe District Council have petitioned in favour of the Ilfracombe Gas Bill.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, March 6.

(*Before Mr. Justice* CHITTY.)

The Meteor Incandescent Lighting Company, Limited, v. The Incandescent Gas-Light Company, Limited.

This was a motion on behalf of the plaintiff Company for an injunction to restrain the defendants from threatening persons, by circulars, advertisements, or otherwise, with legal proceedings or liability in respect of the manufacture, sale, or use of gas-lights known as the "Meteor" incandescent gas-light, on the allegation that they were an infringement of letters patent belonging to the defendants.

Mr. BYRNE, Q.C., Mr. BOUSFIELD, Q.C., and Mr. R. WALLACE, Q.C., appeared for the plaintiffs; Mr. MOULTON, Q.C., Mr. TERRELL, Q.C., and Mr. WALTER represented the defendants.

The case was partially opened on the 28th ult. (*ante*, p. 462); and upon being resumed to-day,

Mr. TERRELL said he was instructed to apply that the further hearing should be postponed until after the case of the Sunlight Incandescent Gas-Lamp Company had been heard, which he was told was fixed to come before the Court on Monday. The construction of the specification was of enormous importance to his clients; and the present plaintiffs were seeking to get an expression of opinion on its construction which would be materially detrimental to the Incandescent Gas-Light Company when the case came to be tried.

Mr. BYRNE stated that, before opening the motion, he told his Lordship exactly how matters stood, and offered to consent to an adjournment if his friends would undertake not to advertise until after the action had been tried; but the offer was refused. He again made the offer.

Mr. TERRELL declined to give any such undertaking.

Mr. BYRNE pointed out that his clients, who were not parties to the action that would come before the Court on Monday, were being seriously prejudiced by the advertisements; and consequently they strongly objected to any further delay. The specification could not be said to cover every possible mantle.

Mr. TERRELL said that was the whole point in the case.

Justice CHITTY: Do you say that it does?

Mr. TERRELL: Certainly; the main point of our case is that it covers every possible mantle.

Mr. BOUSFIELD: That point has been decided in our favour by Mr. Justice Wright.

After some discussion,

Justice CHITTY said he should order the motion to stand over till next Friday, when he would know what was being done with the other case. The present was a very special motion, and would require much consideration. It was always better that any point concerning a patent should be considered at the trial than upon an interlocutory application.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Monday, March 2.

(*Before Mr. Justice* WILLS *and Mr. Justice* WRIGHT.)

Clegg, Parkinson, & Co. v. The Earby and Thornton Gas Company.

This was an appeal from the Yorkshire County Court held at Skipton the claim being for damages for the supply of insufficient and impure gas.

Mr. R. M. BRAY appeared for the appellants; and Mr. C. A. RUSSELL represented the defendants.

Mr. BRAY, in opening the case, said this was an appeal from the judgment of the County Court Judge, who said at the end of his notes: "I find damages to the amount of £50 have been sustained by the plaintiffs; but I give judgment for the defendants, on the ground that the action is not maintainable." The action was practically for damages for bad gas. The defendants were a Gas Company, and the plaintiffs the owners of a factory, which was supplied with gas in the usual way; and their claim was put in several forms—for breach of contract, for breach of statutory duty, and for negligence. It must be taken from the learned Judge's notes that there was ample evidence of the supply of bad gas, and that very large damages arose in consequence. His first point was that this was an action for breach of contract; the defendants having supplied gas not equal to that which they were bound to supply under the contract. Secondly, he maintained that there was a statutory duty; and, if it was necessary, there was ample evidence of negligence. The first answer attempted to be made was that penalties were the only remedy; and, although the learned Judge did not say so, it seemed pretty clear that this was the ground of his decision. Therefore, the question which their Lordships had to decide—which was one of great importance—was whether, where a customer had been supplied by a gas company with gas so bad as to cause him as much damage as £50, or whatever it might be, he had no remedy against the company, except such as was afforded by penalties to be recovered under the Act. It appeared that this Gas Company were under a Provisional Order, by which they took over the undertaking of a previous company. There was nothing special in the Order, except that it incorporated the Gas-Works Clauses Act of 1871, to which he must draw attention, and that it gave them power to supply and sell gas. Sections 11 and 12 of the Gas-Works Clauses Act of 1871 were the ones which were principally material. Section 11 provided that the undertakers should, on being required by an owner or occupier within a certain distance of the main, give a supply of gas, on such terms and under such pressure in the main as should be prescribed; and should lay any pipes necessary, subject to certain conditions as to the cost of the supply-pipe, and that the person requiring the supply should enter into a written contract with the undertakers, if required so to do, to continue to receive and pay for

a supply of gas for a period of at least two years, and to give security for payment of the moneys to become due. In this case, the undertakers did not require the plaintiffs to enter into any written contract, or to give any security. They were very large consumers; and he (Mr. Bray) believed their account came to £60 to £80 a year. He submitted that the liability of the parties must be decided as if this were simply a question of contract. They had not entered into a contract to take a supply for two years, and so would be at liberty at any time to stop it. The Company could also cease the supply at their will; but so long as it was continued and paid for, they were bound to furnish proper gas. Then section 12 provided that the quality of the gas supplied by the undertakers should be up to a certain standard, both with regard to illuminating power and freedom from sulphuretted hydrogen. Section 28 required the undertakers to provide a place for testing the gas; and section 29 dealt with the appointment of gas examiners, either by the authority or by Justices. Then came the penal section (No. 36): "Whenever the undertakers neglect or refuse to give a supply of gas to the owner or occupier, they shall be liable to a penalty not exceeding 40s. for each day during which the default continues." There was a similar penalty with regard to the supply of the public lamps; and, further, it was stipulated that, if it should be proved to the satisfaction of any two justices, not being shareholders in the undertaking, that on any day the gas furnished was at a less pressure or of less illuminating power or purity than it ought to be within the provisions of that or the Special Act, the undertakers should forfeit and pay such sum, not exceeding £20, as the justices might determine. There was no remedy as regarded deficiency of pressure or purity. It was only a penalty to be imposed if, and when, the gas was tested and found to be not up to the standard. Thus, if it were tested on any particular day and proved to be deficient, that would give no remedy for loss or damage occasioned by what had occurred recently. The authorities on which the learned Judge had decided that this case would not lie were mainly two. The first was the case of *Atkinson v. The Newcastle and Gateshead Water-Works Company*.* This was an action by a householder, who had had his house burnt down, against the Water Company, because there was not sufficient water in the hydrants and pipes to put out the fire. The action was held not to lie, because a private person could not have a right of action for breach of a statutory duty.

Justice WRIGHT asked what was wrong with the gas in the present case, to put it shortly.

Mr. BRAY replied that first of all it was wanting in illuminating power—they could not work by it.

Justice WRIGHT inquired if it was not up to the statutory illuminating power.

Mr. BRAY said it must have been much short of that, because there was not enough light to work by; and they actually had to stop the work of the mill altogether for an hour. It was not like that all day, but used to be so principally in the morning between 6 and 8 o'clock. This bad supply went on from November to February. The gas was also very impure—so much so, that it made people ill. One of the witnesses said the gas was so stinking that it made him sick. The work was stopped at least an hour a day, one day with the other. Another said it was bad gas; the men had repeatedly to go out. A further witness said the supply was defective and of bad quality; and the smell was something abominable. Then there was a witness who had been to the works, and said they were defective; giving the cause of the faulty supply as bad coal and inefficient purification. Particulars of damage had been furnished. In the case he had referred to, Lord Cairns said that they must reject at once all that part of the declaration which related to the supply of water for reward, because the breach did not depend on the payment of money. It was held that it was a public duty to supply water, and that no private persons had any remedy in respect of it. Then there was another case which he submitted had equally no bearing on the present action; and this was *Haselwood v. Hoddesdon Gas Company*.† In that it was decided that there was no obligation on a gas company registered under 19 and 20 Vic., cap. 47, to supply a customer with goods for any particular period. It was held that either party might put at end to the supply at a day's notice; and that they could not infer that there was a contract to go on supplying for any definite time, subject to any particular notice. This was in 1859, before the statute of 1871. But there seemed to be no doubt thrown upon the fact of there being a contract; the question was whether this was a term of the contract.

Justice WRIGHT asked what was the contract here.

Mr. BRAY said it was to be implied from the payment for the gas. There was a statutory duty, which said that the gas should be of a certain quality.

Justice WRIGHT asked if there was an express statutory obligation to supply gas at all hours of the day and night.

Mr. BRAY said he was not quite certain, because no point was made about that. It was sometimes one hour of the day and sometimes another when the supply was defective. He then read the Provisional Order under which the Company were acting.

Justice WRIGHT said he gathered there was nothing corresponding to the continuous pressure clause in some of the Water Acts.

Mr. BRAY said the Provisional Order prescribed the pressure under which the gas should be supplied.

Justice WRIGHT asked if there was proof that there was not the proper pressure.

Mr. BRAY replied that there was no doubt about that.

Justice WRIGHT said the question was, was it proved?

Mr. BRAY thought it was proved again and again. It never was tested, because the Company had not supplied any testing-place. One of the witnesses had stated that they were continually without gas; and the correspondence was put in, in which perpetual continual complaints were made. In one letter, the plaintiffs said: "We had to stop our works at 7.30." The defendants replied that any irregularity was entirely due to intense frost; but they had a witness to show that the intense frost ought not to have prevented the supply, and that evidence was not denied.

Justice WRIGHT remarked that they did not appear to sue for nuisance.

Mr. BRAY said not in terms; but there was plenty of evidence of it

Justice WRIGHT thought they seemed to have limited the action to a breach of contract, under section 24 of the Gas-Works Clauses Act of 1871.

Mr. BRAY stated that the original contract to supply was made with the Mill Company, Limited, and confirmed by letter on Dec. 13, 1890. The defendants took over the business and contracts of the Mill Company, Limited, and continued to supply gas to the plaintiffs on the terms of that contract, except in so far as they had committed a breach. In the particulars, reference was made to negligent management; the size of the mains and other things; neglect to efficiently purify the gas; neglect to keep up a proper supply in the store; neglect to maintain the works and machinery in proper order, and particularly in using cracked retorts. He submitted that the two cases cited had no application, and that there was no authority that a consumer of gas who had paid for it had not the ordinary remedy of a person who bought gas which turned out to be inferior. With regard to the penalties, he submitted that the fact that penalties were given was not intended to take away the right of action for breach of contract. The penalty clause was meant to cover apparently the cases of neglect or refusal to give a supply of gas.

Justice WRIGHT: Suppose the Company, after you had made all necessary payments, had omitted to supply you with any gas at all, could you have had an action?

Mr. BRAY said that he submitted so—certainly if they had paid beforehand. Here the defendants had received full payments afterwards, notwithstanding the complaints. If the question of negligence arose, there was the evidence of Mr. Ward, a civil engineer, who stated that they had not complied with the Order, as there were no means of testing for illuminating power or for sulphuretted hydrogen, or of ascertaining the pressure and regulating the same. He also said the works were the worst he had been into for 30 years. He never heard of gasholders in use being frozen; and it could be avoided by reasonable care. As to the question of damages, Mr. Parkinson was called, and said the actual loss in standing wages was £80 16s, without taking into consideration rent and interest on capital. Bad work was turned out in consequence of the indifferent light; and for this they had to make allowance. The defendants' submission was simply that there was no contractual duty between the plaintiffs and defendants, and no written contract under section 11. Now, this section only said they should enter into a written contract, if required to do so, to take the gas for at least two years. The only effect of this would be that they could discontinue it altogether; and it was not suggested that they did this. There was another case which might have some bearing on the question—*Milnes v. Mayor and Corporation of Huddersfield*.* This action (which went to the House of Lords) was brought against the Corporation for supplying water which became bad when it came into contact with leaden pipes.

Justice WILLS said he did not think that case really threw any light upon the present one, because the decision there was that the Corporation's duty ended with the main; and if the water was pure and wholesome when delivered out of the main, it was not a breach of their statutory duty because it was almost certain to create mischief when it reached the pipes by which houses were supplied.

Mr. BRAY said that was quite true; but there were some passages in the judgment which might have some bearing upon it.

Justice WILLS said perhaps the strongest dictum in favour of Mr. Bray was what Lord Halsbury said in the beginning of his judgment—that the plaintiff, in order to succeed, must prove a breach of the duty created by section 35.

Mr. BRAY submitted that when the Legislature were imposing the penalty here, they were not considering the injury that a person supplied with gas might sustain, but were only giving remedies for particular circumstances which might be enforced by anybody. He submitted on the evidence that there was a contract which had been broken; and even if there were no contract, there was a statutory duty which had not been fulfilled, for which the plaintiffs were entitled to recover.

Mr. RUSSELL, for the defendants, said the learned Judge found there was no evidence of contract by the Gas Company to supply the commodity. It was purely a statutory duty; and it was only this duty they had to deal with. The Company desired to raise what was to them a very important question. At the time when the complaints by the present plaintiffs arose, the Company were under a number of difficulties from a variety of causes with regard to the supply of gas.

Justice WILLS said he thought the Court need not go into that.

Mr. RUSSELL went on to say that under section 11 of the Act of 1871, they were bound to supply anyone who required gas. If this decision were reversed, their position would be that probably, although in very great difficulties for reasons which would have been a good defence against proceedings for penalties, they would be subject to an action by everyone in the district to whom they supplied the gas. He submitted that this was not the intention of the Act of Parliament. By section 11, they were bound, on being required, to give a supply of gas. Mr. Justice Wright had asked if they were obliged to do it at all times. He thought that must be so, because there was no limit of time mentioned; and in the Provisional Order regulating the pressure, it provided for a certain pressure between sunset and midnight, and a different one between midnight and sunset, dealing with the whole 24 hours, and allowing the Company to have a rather lower pressure at one time than another.

Justice WILLS, having intimated that they did not desire to hear the learned Counsel any further, proceeded to deliver judgment as follows: The question first raised here seems to me to be free from difficulty. In this case the supply of gas, just as in a Water-Works Company the supply of water, is regulated by Act of Parliament; and it is a Public Act, and intended to provide for the wants of a large community. It is certainly a very cogent observation to be made on the threshold of any discussion that this Act of Parliament and similar Acts of Parliament have not been enforced for I do not know how many years—for half a century at least; and that in no case of this kind has an action ever been successfully maintained. I think the reason is obvious.

* See "JOURNAL," Vol. XX., p. 151.
† *Ibid.*, Vol. VII., p. 353; Vol. VIII., p. 261.

* *Ibid.*, Vol. XLVII., pp. 496, 1010; Vol. XLVIII., p. 150.

It is one of those cases in which the principle applies, which is very well known at common law, that where there is a duty created—a common law duty or a statutory duty—which affects a very large number of the public, as the public, the remedy if the duty is not performed is to indict or to take such proceedings as the Act of Parliament may provide. It does not follow because there are provisions in the Act which do not meet a case of this kind, that an indictment would not lie for breach of a statutory duty which is not provided for by penalties. But when you have an immense number of persons served under conditions of this kind, if a number of actions were allowed to be maintained by everybody who could not make any special ground for doing so, the undertakers might very well be ruined, and great public undertakings might be brought to naught. It seems to me that it is in consequence of the application of a principle of this kind that actions of this nature cannot be maintained. I do not say that this is the same as Atkinson's case, and it is not the same as the Corporation of Huddersfield case; but I think the action fails on a principle which lies deeper than anything that is discussed in those cases—viz., that where you have Acts of Parliament which are for the protection and benefit of the public, and which impose on the persons who deal with the public statutory obligations that the article which they produce and disseminate shall be pure up to a certain standard, and so on, it never was intended to give a separate action to every person who was injured in no other degree than every one of his neighbours who had a like supply. I think on that principle the action fails. This presents a close analogy to the case of a breach of statutory duty on the part of a local authority to provide efficient sewerage for the district which they serve. Such an action has been held not to be maintainable; and it is the same grounds as those which guide me to the conclusion that this action is not maintainable.

Justice WRIGHT: The obligation of the Gas Company (if any) in this case does not depend on contract at all, but upon statute. Contracts are made; but they only regulate the price or mode of payment. Now the general rule of law is that where a general obligation is created by a statute, and the same statute prescribes a specific remedy, that is the only remedy. This doctrine is as old as *Stephens v. Evans* [2 Burrows]; and it was laid down again in *Doe dem. Bishop of Rochester v. Bridges* [1 Barneswell and Adolphus], in *Stephens v. Jacock* [11 Q. B.], and many other cases. The last, I think, is the *Queen v. The County Court Judge of Essex* [18 Q. B. Div., p. 704]. Here the specific remedy is provided by the statute; and it seems to me to be the only one. I am not sure that there is any absolute obligation on the gas companies to supply. I cannot find the section; but I think there is something which, under circumstances of difficulty, enables them to discontinue. But however that may be, there is no contractual obligation. It occurred to me for a time that there might possibly have been a cause of action as for a nuisance, although I doubt whether that is in the particulars; but I do not think that would do either, because if there is a nuisance on the plaintiffs' premises it is consequent on the turning of the gas-cock. All he has to do is to turn the gas-cock off, and the nuisance will not exist. Therefore, I think on all grounds the action fails.

Mr. RUSSELL: The appeal will be dismissed with costs?

Justice WILLS: Yes.

Mr. RUSSELL: I do not know whether Mr. Justice Wright was thinking of what is a usual clause in Provisional Orders: "No penalty shall be incurred by the undertakers in cases in which they prove that the defect or insufficiency was caused by unavoidable cause or accident."

Justice WRIGHT: Yes; that tends to show that there is no absolute contractual obligation.

Mr. BRAY: Will your Lordships give leave to appeal? It is the first time this question has ever been decided.

Justice WRIGHT: Yes.

(*Before the* LORD CHIEF JUSTICE *and a Special Jury.*)

Christie v. Fox and Others—The British Water-Gas Company, Limited.

This was an action brought by Mr. W. L. Christie, of Settle, Yorkshire, to recover £2664, damages for alleged fraudulent conspiracy, whereby the plaintiff was induced to purchase shares in the British Water-Gas Company, Limited, which resulted in the loss by him of the amount in question. There were in all five defendants—viz., Mr. Samson Fox, Mr. J. C. Cottam, Mr. J. Hyde, Mr. J. Hyde, jun., and Mr. B. Bagshawe; and their defence was, in short, a denial of the charge of conspiracy, and a plea that the Company was a *bonâ fide* one. They further denied that there had been any misrepresentation in the prospectus.

Mr. COCK, Q.C., Mr. M'CALL, Q.C., and Mr. T. M. WHITEHOUSE appeared for the plaintiff; and the defendants were represented as follows: Mr. Samson Fox, by Sir E. CLARKE, Q.C., Mr. CARSON, Q.C., Mr. H. F. BOYD, and Mr. COLEFAX; Mr. Cottam, by Mr. E. H. CANNOT; Messrs. Hyde, by Mr. GREENE, Q.C., Mr. E. MORTEN, and Mr. E. B. ROWLANDS; Mr. Bagshawe, by the Right Hon. H. H. ASQUITH, Q.C., and Mr. COLEFAX.

Mr. COCK, in opening the case, said the inquiry would be of considerable importance—to the plaintiff, because he had lost some £2600; and to the defendants, both on pecuniary grounds and in consequence of the issues raised as to character. It was also important to the public at large, as relating to the liability of people who conspired to "rig" the market in shares. The plaintiff, who was a man of means, and of no occupation, asserted that the British Water-Gas Company, Limited, never had, and was never intended to have, any genuine business, but that it was put upon the market for the purpose of speculating in the shares and furthering the ends of the defendants, who were all its promoters. The Company proposed to take up the making of gas from water—a process which was possible, but only for certain limited purposes. Steps were taken early in 1889 to bring forward the water-gas question in the Press. Works of a Mr. Wilson, at Stafford, were obtained, where water-gas generators had been manufactured, and various patents were acquired. The prospectus was issued on March 10, and was misleading in the statements with regard to the Stafford works and as to the patents which had been obtained, and which he asserted were worthless. It was also falsely represented that the system had been in actual use, and had been most successful. As a fact, experiments had been made at some works at Leeds in which Mr. Fox was interested, and had proved an utter failure. The Company was registered on April 1, 1889; and in March, Messrs. Hyde and Co. were communicating with brokers in various parts of the country, to whom they offered a commission for placing shares, and were requesting their customers to send applications. These were in a very curious form—asking them to apply for three times as many shares as they wanted; adding that they would undertake only to allot the number really required. Applicants were also to undertake not to sell their shares till after the special day of settlement on the Stock Exchange. Nearly the whole of the shares were thus tied up until a date to be fixed by the defendants. Those who made application for shares on these terms obtained them; others did not. The capital was £300,000, in 60,000 shares of £5 each; and the Company came out on April 1. Late that night a meeting was held at Cottam's office, at which Fox, Cottam, Hyde, and some others, were present, and at which the shares were allotted. A sum of £2 was paid up on them. There was a mania about the shares for a short time; and in May the shares, on which there was a liability of £3, had gone up to a premium of 21. This apparently induced some of the holders to break their agreement, and put their shares upon the market; and the price then began to fall. The plaintiff received a prospectus on April 1, and invested in shares later; but he did not apply for shares. Subsidiary companies were formed for the purpose of acquiring rights of the British Water-Gas Company for various districts—rights which had no real existence at all. The shares of these Companies amounted to £600,000; and this, added to the "leakage" of shares from the shareholders of the British Water-Gas Company, caused a further fall. It became necessary to keep up the price. There was a meeting on May 8 of those interested, at which Fox, Cottam, Bagshawe, and others were present; and they agreed to purchase shares "at best price under 19, or at 19 premium. Shares to be purchased in the name of Mr. Samson Fox." During the next month, about £100,000 shares were so purchased. The special settlement was on May 24, when the price was falling. In November, the Company paid a dividend of 5 per cent. But on Nov. 29, 1893, no further dividend had been paid; and it went into voluntary liquidation. The subsidiary Companies had expired previously.

The following evidence was given in support of plaintiff's case:—

Mr. *W. L. Christie* said he received the prospectus of the Company on April 1. It contained the heading: "Water Gas proved a Commercial Success (see report enclosed);" but no report was enclosed. He was impressed by the prospects depicted in the prospectus, but did not apply for shares at the time. He watched the price of shares in the papers; and from the first quotation till May 6, it gradually rose. On May 6 he bought 60 shares; and altogether he purchased shares for which he paid £2664 9s. He had also paid calls amounting to the sum of £225. He bought the shares to keep; and he still had them.

Cross-examined by Sir E. CLARKE: He was not sure whether he received the prospectus from the Company or from his brokers. He had never before that bought and sold shares; but he might have bought some for investment. He bought 225 shares, and twelve months later transferred 200 of them to Mr. T. Proctor, a shareholder of the Company. Proctor was a Director, and a supporter of Mr. Fox on the Board; and he so remained till November, 1893. Witness had never been to any meetings of the Company. The shares were carried over till the special settlement, when he paid for them.

Other witnesses having testified to applying for shares,

Mr. *J. Wade*, a civil engineer, said he was engaged by Mr. Fox as his private engineer, and went to the Leeds Forge, where experiments with water gas were being carried out. There were several fixtures—some for illuminating purposes, some for steel smelting, and some for welding. In the course of conversation, Mr. Fox frequently expressed an opinion that the thing would be a grand success; and he (witness) did his best to make it so. He was Engineer for the North British Company, and put up an installation for them. He had had an opportunity of seeing the water-gas arrangement that was being worked experimentally at the Leeds Forge before he was appointed by the North British Company. The only purpose for which water gas was employed successfully in manufacturing was welding; for every other use it was, in his opinion, unsuccessful. He did not tell Mr. Fox that water gas was a failure as an illuminant; but the price was high in comparison with natural gas. He believed Mr. W. Fox had 1500 shares in the Company allotted to him, and had cleared out. When Mr. Samson Fox heard of it, he was very angry, and made him buy them back again. He (witness) gave Mr. Fox his views on water gas by letter. He said it could not be applied for steel smelting, and that ordinary producer gas did just as well, and was very much cheaper. As a lighting agent, it was absurd in the face of the electric light and the improved illuminants brought out during the past ten years.

In cross-examination by Sir E. CLARKE, witness adhered to his statement that water gas as a lighting agent was "absurd," even when employed with a magnesium wire or "comb." He admitted that, as burnt in Mr. Fox's office, it was a very good illuminant; but he said that he personally would not put in water gas if he could get the electric light.

Tuesday, March 3.

On the resumption of the proceedings this morning,

Mr. *Wade* was re-examined by Mr. M'CALL. He stated that the Leeds experiments with water gas lasted for twelve months. He repeated that for welding it was useful. But for lighting it was absurd to attempt to employ it; and he knew of no place where it was used alone as an illuminant. It was made at Leeds under the patents owned by the Water-Gas Syndicate.

Mr. *A. Wilson*, the vendor to the Company of the works at Stafford where generators were manufactured, and subsequently the Company's Manager, said he saw a draft prospectus, and remonstrated with Mr. Cottam as to certain statements which he thought might mislead the public. The names of firms were given who had purchased generators

from his firm; and he did not think it was made clear that these were not water-gas generators. Cottam replied that he had had more experience than witness in drawing prospectuses; and he would take the responsibility. Witness's system differed entirely from that of the Company. The Fox system was used on a large scale in Moravia. He did not tell the plaintiff's solicitor that Fox's system was a failure, nor was it in fact a failure. He probably said that water gas was an entire failure for steel smelting. He possibly said that it was commercially a failure at that time, as introduced by Mr. Fox; and that such a failure was not due to any want of intrinsic merit in the system, but to the bungling way in which the concern was commercially conducted while he was Manager. The business was not exploited on commercial lines; and it got a bad name on account of the Stock Exchange speculation connected with it, which made manufacturers shy of it. Witness was Manager from April till October, 1889, when the Board accepted his resignation. He probably told Mr. Nunn, the Company's Solicitor, that the energies of the Board were diverted from the business of the Company by Stock Exchange speculation. He did not think any work was done at Stafford while he was Manager. Works were purchased by the Company near Glasgow for manufacturing water-gas plant, and some was made there.

In cross-examination by Sir E. CLARKE, witness said he had been engaged in the manufacture of gas and gas-producing plant for sixteen years before his connection with the British Water-Gas Company. He read a paper in 1884 upon water gas as applied to metallurgical purposes; and there was published in January of that year a paper on water gas for heating and illumination in the "Journal of the Chemical Society." In that paper he expressed regret that the invention of water gas and the working of it out to success did not fall to a British engineer; and he spoke of the working out of a successful regenerator at Essen. He alluded also to various improvements in the plant for the manufacture of the gas both at Essen and Witkowitz. When he read the paper, he exhibited an incandescent gas-light, and referred to the economic aspect of water gas for heating and other purposes. [The learned Counsel read extracts from witness's paper, in which opinions were expressed as to the value of water gas and the prospects of its development. Most of the experiments and successes spoken of referred to the Continent; but, coming to England, witness mentioned those carried on by Mr. Fox at the Leeds Forge. It was also stated that the process had been successfully worked in Italy and Switzerland, as well as in America.]

His LORDSHIP asked if it was necessary to read any more of this.

Sir E. CLARKE said he wished to get before the jury as early as possible the opinions the witness entertained in reference to water gas long before he was brought into contact with Mr. Samson Fox. (To witness:) The opinions you stated in the paper were your opinions at the time?

Witness: Yes.

I see you state that water gas had all the conveniences of coal gas with the brilliancy of the electric light, and could be produced at about half the cost of coal gas?—Yes; that was my view.

Cross-examination continued: He had the prospectus of the Company submitted to him in proof before it was sent out; and the statements therein which he authorized were correct. It was true that the light produced by water gas rivalled the electric light in brilliancy. The gas had been used for many months in his own house, for both lighting and heating purposes. The apparatus, after being removed from his house, was exhibited at Windsor. Water gas was dangerous; and at the Leeds Forge, in 1892, two men were suffocated by it.

Re-examined: He told Mr. Davy he had reported to Mr. Fox that water gas was an absolute failure for steel smelting; but he did not say it was a failure for all purposes. After his verbal statement to Mr. Fox, he was not asked to make any written report. In Mr. Davy's presence, he told Mr. Fox that in Germany they were informed that water gas was not a commercial success for smelting. He then regarded the use of water gas for that purpose as the important point; but this was not now his opinion. Very likely he told Mr. Fox that it would be injurious to the interests of the Company if his opinions were known; but he had not the slightest idea whether his statement was conveyed to the Directors.

By his LORDSHIP: Water gas was used as an illuminant at Belfast. It was in 1889 a proved commercial success in America; and a large part of New York was lighted by its means. It would, in his judgment, be correct to say that in 1889 water gas was a proved commercial success.

Mr. *A. Davy*, engineer, of Sheffield, examined by Mr. M'CALL, stated that, at the time of the formation of the Company, he was acquainted with the theory of water gas, but did not know about it practically. In 1889, he was asked by Mr. Fox to become a Director of the Yorkshire and Lancashire Water-Gas Syndicate. Mr. Fox said they had orders for hundreds of plants; and it would be a source of work for witness's firm. Witness said he would consider the matter; but Mr. Cottam, who came into the room where they were, said there was no time for considering the matter, as they were about to issue the prospectus. Witness then accepted the offer. He came to London, and had an interview at the Holborn Viaduct Hotel. Up to that time, Mr. Fox had not described the process by which the gas was to be made. He asked him for information about the orders; but no orders were forthcoming. It was the same with regard to the plans, Mr. Fox promised them, but they were never sent. When witness wanted to speak to Mr. Fox about the commercial part of the affair, that gentleman used to evade him. At a number of informal meetings, at which the defendants were present, all the talk was about running up the shares, or preventing them running down, by purchasing; and the commercial question was not referred to. In April, the Yorkshire Company was brought out, with a capital of £150,000. Witness was the only Director who knew anything about water gas. Up to the time of his retirement from the concern in 1889, no work of any kind had been done. About May 20, 1889, Fox and Cottam told witness that they wished the Yorkshire Company to buy a certain quantity of shares in the British Company, who would buy the same number in the Yorkshire undertaking. Mr. Cottam said this was for the purpose of amalgamating the interests of the two concerns. The proposed arrangement was carried out. Mr. Cottam asked him if he would join the pool; and ultimately he signed the agreement. He was told that its object was to run up the price of the shares in the market. He was pressed to find his share of the money, but never did so. Subsequently he was served with a writ from the bankers; and an action was brought against the signatories of the agreement. But he paid no money, and never heard anything more about it. He went to Essen three times; and after his third visit, he was told that water gas was a failure for steel smelting. He saw no lighting by water gas there, except at a public-house and on a road leading to some works. They were told at another place in Germany that there was no water gas working; and it was going to be given up. After he and Mr. Wilson returned from Germany, they saw Mr. Fox, and Wilson said: "The best thing you can do is to poison Mr. Davy and myself, rather than that we should go out and report what we have seen." They had reported what they had seen to the Secretary of the Yorkshire Company. Mr. Fox flew into a rage, and Wilson left the hotel. Witness also did so; and had never seen Mr. Fox from that day until he saw him in Court. The Yorkshire Company never carried on any business, and had no funds, he thought, with which to do so. They were all expended or wasted in speculations in shares. Afterwards he met Mr. Cottam, and complained of the mess he had got into over the pool. Cottam said Samson Fox himself broke the pool by selling his own shares; and he (witness) would hear no more about it, for Fox dared not say anything about it.

In cross-examination by Sir E. CLARKE, witness said he saw the draft prospectus, which bore his name, and never did anything to disavow the statements contained therein. In regard to the pooling agreement, it was thought best to buy shares, to prevent a rapid fall in price. He concurred in it, and thought that there was nothing wrong in it. Several letters were read which had been written by witness, expressing approval of the prospects of the Company; and he said he believed in those prospects at the time. In the course of other correspondence, he claimed consideration from Mr. Fox, on account of the ruinous losses he had sustained through the Company. He wrote from Germany to the effect that he was delighted with the results there, which were splendid, and said he regretted he had not been sooner associated with Mr. Fox in the undertaking. He suggested that it should be made worth his while to work the thing up; and he probably meant that he should be Consulting Engineer to all the Companies. At that time, he thought he could make the Company a great success. Witness said he was now of opinion that a furnace might be made strong enough to enable water gas to be used for smelting purposes, but that would entail experiments and expense. He refrained from telling the shareholders the result of his visit to Witkowitz, because he thought it should come from the Directors, to whom he had communicated it; and he wished to avoid a row.

Wednesday, March 4.

At the sitting of the Court this morning,

Mr. COCK asked permission to make a statement. He said the issue had been raised by the defendants as to the validity and value of the patents—a question which would involve a long and most expensive inquiry. The action was originally based on the Stock Exchange transactions; and the business part of the case was only introduced for the purpose of showing what was the real object of the formation of the Company. The plaintiff considered the trial of the issue as to the patents would cost many thousands of pounds; and he could not afford to pursue it on that ground. He therefore proposed to assume that the patents might have had some value, but to maintain that it was never intended that there should be any business done by the Company, and that it was formed merely for purposes of Stock Exchange speculation. He was prepared to strike out of the statement of claim those portions which referred to the patents.

The LORD CHIEF JUSTICE said it was obvious that the question whether the patents acquired by the Company were or were not valuable must have a serious bearing upon the case. The defendants could not, in view of the charges which were still made with regard to the alleged manipulations at the time of allotment, the tying-up of the shares, and the suggested attempts to give them a fictitious value on the Stock Exchange, be asked to make any concessions. Issues still remained upon which the defendants could give any evidence as to the value of the patents, and the processes to which they referred. He, therefore, doubted whether the concessions which the plaintiff proposed to make would materially lessen the length or the expense of the inquiry. Could not some course be taken which would end the litigation altogether? Of course, nothing could be done while any charge of fraud remained.

A discussion having taken place,

Mr. COCK said his Lordship's suggestion had been considered, and a determination come to. He withdrew all the charges of fraud contained in the statement of claim; and this having been done, his friends desired to make a statement. There would be judgment for the defendants, who would not make any claim for costs, except in the case of Mr. Greene's clients (Messrs. Hyde).

Sir E. CLARKE said that, in view of the sudden change in the aspect of the case—a change which had come to him entirely as a surprise—he thought it was reasonable that he should say one word on behalf of his client. Statements had been made as to a letter which was sent out asking applicants for shares in the Company to apply for three times as many as they needed, and as to a midnight meeting for allotment. Mr. Fox never heard of the letter till last year; and the suggestion as to the midnight meeting was a mistake. There was no evidence that it took place; but he would explain what really happened. At 4.30 in the afternoon, the Allotment Committee was appointed; and they were to meet at 11 o'clock on the following morning. They did meet at that hour; but in the meantime there was much clerical work to be done—there were 936 applications for 250,000 shares. The shares were allotted, as would have been proved by the register, without any reference to where the applications came from; and no preference was shown to any person whatever. On the other part of the case, as to the value of the patents and the prospects of the industry in question, he should have called Mr. Samson Fox himself—a man of considerable experience, who used the water gas at his Leeds Forge works. He should also have called an accountant, who would have proved

that at these works alone the use of water gas effected a saving of £10,000 a year. He should have called Sir Henry Roscoe, Sir Douglas Fox, and many other eminent men; and he believed that at the close of his evidence no doubt would have been left in the minds of his Lordship or the jury. The inquiry would, however, have been costly; and, as all the charges affecting the honour of his client had been withdrawn, he could with perfect propriety say that he was content to accept judgment without pressing for costs. He should add that neither Fox nor Bagshawe ever sold a single share, though both had bought many.

Mr. ASQUITH said no evidence whatever had been given against Mr. Bagshawe, whose advisers had always been confident that there would be no shadow of a case against him. He had never at any time been a promoter or a director of the parent or of any of the subsidiary Companies. He had acted in perfect good faith throughout, and had lost money by the undertakings.

Mr. GREENE said that Messrs. Hyde were merely the brokers, and not the promoters of the Company. He could have proved that all the letters relating to applications for a treble number of shares were withdrawn. They were never members of the "pool," nor did they profit by it; and it was inaccurate to assert, as had been done, that they had been expelled from the Stock Exchange. They had been compelled to leave it by the rules, though without discredit or disgrace, owing to their inability to meet certain obligations.

Mr. CANNOT said that Mr. Cottam only took part in the financial operations connected with the Company after he had satisfied himself of the favourable opinions entertained by practical men.

The LORD CHIEF JUSTICE said that neither he nor the jury were called upon to say anything. They would conform to the conclusion that had been come to by returning a verdict for the defendants. It only remained for him to say that, as the defendants had not had their case gone into, it was quite proper that statements should have been made by their Counsel.

Verdict and judgment accordingly.

The Incandescent Gas-Light Patents.

The hearing of the action of *The Incandescent Gas-Light Company v. The De Mare Incandescent Gas-Light System, Limited*, began yesterday before Mr. Justice Wills in the Queen's Bench Division of the High Court of Justice. Mr. Fletcher Moulton, Q.C., opened the plaintiffs' case, and Mr. James Swinburne was under examination and cross-examination for the rest of the day. A full report of the proceedings will appear next Tuesday.

Gas Supply to Premises in a Receiver's Hands.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Kekewich, an application was made by Mr. Renshaw, Q.C., on behalf of the Receiver of the Albert Flour Mills at Battersea, for an injunction to restrain The Gaslight and Coke Company from cutting off the supply of gas to the premises. The proprietors were in arrear for gas to the extent of £90 14s. Mr. Warrington, Q.C., who appeared for the Company, said a question had arisen whether or no the Receiver was a tenant, within the meaning of the statute, entitled to a supply of gas without (and, as the Company said he must do) entering into a written contract, which he was indisposed to do, or to give security for payment. His Lordship said that was a question to be decided; but it seemed somewhat hard that, pending this decision, the plaintiff, as administering a business, should be cut off from so necessary a thing as a supply of gas. Mr. Warrington said the Company were acting strictly within the provisions of their statutory powers. They were willing to give every facility for the case being brought on on an early day; and perhaps meantime some arrangement might be made by which the gas need not be cut off. Mr. Renshaw said that, subject to that point of convenience, he agreed that what was to be decided before his Lordship was largely a question of law. Mr. Warrington suggested that plaintiff (Mr. Paterson) might pay over the arrears on an undertaking by the Company to return them—an offer which had been already made. His Lordship said he was willing to help the parties to bring on the case and have it tried, but not to assist the Company's practical issue of execution on a motion of this kind. Mr. Warrington said he would be content to continue the supply on plaintiff giving an undertaking in respect of the gas he might use in carrying on the business. On Mr. Renshaw agreeing to do this from the date of plaintiff's appointment, the matter was ordered to stand over for a week.

The Complaints of Nuisance from the Plymouth Gas-Works.

The complaints made by the occupiers of property contiguous to the Plymouth Gas-Works of nuisance therefrom, to which reference has been made in the "JOURNAL," recently came before the Queen's Bench Division of the High Court of Justice in an action brought by Mr. W. O. Ward against the Company. Plaintiff, who owns a tannery adjoining the gas-works, claimed damages and an injunction to restrain the defendants from carrying on their business in such a way as to cause a nuisance. In the pleadings, it was stated that plaintiff had for twenty years, until September, 1894, carried on his business without experiencing any annoyance from the works, though the old retort-house was situated on the southern side of the tannery, and his drying-lofts extended close up to the Company's northern boundary. In 1893, the Company, on land purchased from the plaintiff, commenced the erection of a new retort-house, extending in front of, and beyond, plaintiff's drying-lofts; there being a distance of only 20 yards from their southern end to the new retort-house. The new block was completed in September, 1894; and, simultaneously with its opening, a nuisance was created. When south, south-west, and south-east winds prevailed, volumes of smoke and dust were, it was alleged, emitted, and settled all over the plaintiff's premises, internally and externally. Much dust was also created by quantities of hot coke being stacked against the boundary wall dividing the gas-works from the tannery. The effect of the deposit of dust on the leather while in a half-dry state was to soil and make it altogether unsaleable; and plaintiff had to take special precautions to keep the leather clean. As the result of private consultations between the Counsel engaged in the case (Mr. M'Coll, Q.C., and Mr. W. Graham, Q.C., for the plaintiff, and Sir E. Clarke, Q.C., Mr. Channell, Q.C., and Mr. H. E. Duke for the defendants), an injunction was agreed to; "the defendants alleging, and the plaintiff not admitting, that the cause of nuisance has been removed since the action." The question of damages is *sub judice*.

Main-Laying Contractors' Liabilities.

In the Queen's Bench Division of the High Court of Justice last Friday, Mr. Justice Wills and a common jury had before them an action brought on behalf of a little girl named Gould, the daughter of a shopkeeper in Devonshire Street, Chiswick, to recover from a Mr. Rhodes damages for injuries sustained by her through alleged negligence. The facts were as follows: On the afternoon of Sunday, March 24, 1895, plaintiff was sent by her father on an errand to the High Street, Chiswick. Messrs. John Aird and Sons had been relaying the West Middlesex Water Company's pipes under the pavement; and their men had put down the flagstones in a temporary way. Many of the stones, it was said, were fractured; one in particular being broken into three pieces. The plaintiff caught her foot against one of the pieces, fell, and a bottle she was carrying was broken. A piece of the glass entered her left elbow, and a nerve was severed. She was under the care of Dr. Causton until August; then an operation was performed at Guy's Hospital, and she had been an attendant at the Hospital ever since. She had lost the use of the little finger, and partially the use of the next one, of the left hand; and it was believed the injury was permanent. On the 26th of March, the defendant, with a representative of the Water Company, called upon Mr. Gould, said he was the contractor for the work, and tried to settle the matter by paying £5. For the defence, it was said that though the defendant was generally employed by the Company to do this kind of work, yet as to this particular job he had no contract to do it until the 28th of March. It was also said that the flagstones had been so put down by Messrs. Aird's men that no person who used ordinary care could fall over any one of them. The jury found a verdict for plaintiff for £65.

Charge of Misrepresentation by an Incandescent Gas-Burner Seller.

At the Guildhall Police Court on Monday last week, David W. Burnett, of Church Road, Homerton, was summoned before Mr. Alderman Faudel Phillips, at the instance of John Richard Hindmarsh, for having, on Aug. 10, 1895, obtained £1 19s. by means of false pretences, with intent to cheat and defraud. Mr. Young, who appeared in support of the summons, stated that the complainant was a cutler, carrying on business in Beech Street, Barbican. In August last the defendant called on him and represented himself to be an agent of the Incandescent Gas-Light Company, Limited. Complainant, believing this, purchased four burners of him; but he subsequently found they were not those of the Company. Mr. Young added that this was not a solitary case, as the Company had been informed that the defendant had sold burners on other occasions, representing himself to be their agent. This was a case of considerable importance both to the Company and to the public. Mr. Hindmarsh was called, and stated that when he purchased the burners he thought the accused was an agent of the Incandescent Gas-Light Company. Mr. G. Gutch, the Assistant-Manager of the Company, proved that the burners sold by the defendant were not their make. They were lighter in weight, contained less brass, and were not so well finished; moreover, they consumed more gas. He said the defendant was not an agent of the Company. The defendant denied having so described himself. The Company, he said, had always tried to stop his selling these burners, and this was their latest dodge. The Alderman thought it was a case that ought to go before a jury; and he committed defendant for trial—admitting him to bail.

A Caretaker's Water Supply.

At the Sheerness County Court, last Wednesday, before Judge Selfe, the Sheerness District Council sued Mr. F. Wright for 14s. for water supplied to a house at Blue Town while he was residing on the premises as caretaker, free of rates and taxes. The defendant disputed his liability, and said that the Sheerness Stipendiary Magistrate (Mr. E. J. Athawes) had held that the owner was not responsible for the district rates in respect of this property, because there was no profitable occupation of it. He (defendant) disputed liability because he was not tenant of the house. No rates were paid; and a bill was in the window stating that the premises were to be let or sold. Defendant had not been in the house for eight months; and while he was the caretaker no claim for the water-rate was ever made. Mr. Wyatt, the rate collector, said he was proceeding under the order of the Council, who were the water authority under the Public Health Act; and the rate was recoverable from the person who used the water. In reply to his Honour, defendant said the water was laid on when he became caretaker; and he certainly used it. He was told, however, by the owner, that he would have nothing to pay for it. When the pipes were found defective, and the Council ordered them to be repaired, the owner paid for the work. Replying to his Honour, Mr. Wyatt said no claim was made upon a landlord for water when a house was empty; but a house occupied by a caretaker was not considered as empty. His Honour said defendant had admitted using the water, and he was therefore liable for payment. There would be judgment for the amount claimed.

MISCELLANEOUS NEWS.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The profit of the Ascot Gas Company for the half year to Dec. 31 last was £740, which was a slight falling off compared with the corresponding period of 1894. It was explained by the Chairman (Mr. Robert Berridge), at the meeting of the shareholders, that this was due to the considerable reduction in the price of gas, and to the low rates for residuals. Altogether, however, the business was satisfactory, and things were improving. He also stated that they had only a small amount of capital in hand; and they were really working and doing a great deal out of revenue. The number of consumers had risen by 41; and the sale of gas had increased by 7 per cent.

The ordinary general meeting of the Bognor Gas Company was held last Wednesday—Mr. H. Lovett presiding. The Chairman said the Company had recently obtained a Provisional Order, under which they had the advantage of the sliding-scale. The balance-sheet showed that during the last half-year they had a net balance of £910, out of which the Directors recommended the payment of a 10 per cent. dividend upon the original capital, and 7 per cent. on the new shares. This would absorb £553, leaving a balance of £357 to the credit of the profit and loss account. The works and plant were in good order; and the affairs of the Company generally were in a prosperous condition. The report was adopted.

The Directors of the British Gaslight Company, Limited, propose to recommend a dividend at the rate of 10 per cent. per annum for the half year ended Dec. 31 last, with a bonus of 2s. 6d. per share, both free of income-tax.

Speaking at the half-yearly meeting of the Bromley Gas Consumers' Company—at which the Directors' report, given in the "JOURNAL" for the 18th ult., was adopted—Mr. A. Dickson (the Chairman) said the shareholders could be congratulated on the Company having succeeded in getting the amount of the new assessment of their property reduced, because any increase in the assessment of gas-works where there was a sliding-scale of profit and of price in operation tended to the disadvantage of the gas consumers concerned. He could not see why anyone who chose to burn gas rather than oil should be thus called upon to contribute more to local taxation. The adoption of prepayment meters brought this question rather more into the foreground, and made it one which affected the interests of the less wealthy portion of the gas consumers in Bromley. He hoped this would be borne in mind by the authorities who had charge of assessment matters, and that in future they would take a different view than that of "putting the screw on" the Company. On the motion of the Chairman, it was resolved to create debenture stock to the extent of £2400. The Company have already issued £1800 of 3½ per cent. debenture stock; obtaining an average price of £105 2s. 8d. for each £100.

The annual meeting of the Brynmawr and Blaina Gas Company was held in the Board-room at the Blaina Gas-Works on Tuesday, the 25th ult. The Chairman (Mr. J. Phillips, J.P.) remarked that the accounts for the year ending Dec. 31 last showed that the Company were now, thanks to the efforts and ability of their Engineer and Manager (Mr. T. Acland), in a highly prosperous state; and for the first time in their history, they were able to pay a dividend of 10 per cent. free of income-tax, although the sum of £1000 had been spent out of revenue for repairs during the year. The balance carried to the credit of the next account was £1830. He further stated that, with the completion of the scheme recommended by Mr. Acland for further improvements during the summer of the current year, the Directors intended to reduce the price of gas by 6d. per 1000 cubic feet next winter season. He thought this would be gratifying to both the proprietors and the consumers. A second sum of £25 was awarded to Mr. Acland, making £50 during the year, in respect of his extra services in carrying out the extensions. The accounts were passed; and votes of thanks to the Chairman, Vice-Chairman, and Manager, who all suitably responded, terminated the meeting.

The annual meeting of the Cheltenham Gas Company was held on Monday last week—Mr. R. J. Ticehurst presiding. In moving the adoption of the report, the Chairman said that all the share capital had been expended; and consequently the Directors had called up £10,000 of the £20,000 of debenture capital still unissued. An examination of the accounts for the past year showed that there had been a falling off in the profits, arising from simple causes. The price of gas was reduced, and then very unexpectedly the Company had to raise the workmen's wages. A reduction of 2d. per 1000 cubic feet in the price of gas made a decrease of between £2000 and £2500 in the revenue; and the increase in the workmen's wages diminished the profits by a further £1000. There had also been a considerable falling off in the receipts from the sale of sulphate of ammonia, which the Company had had great difficulty in getting rid of at about one-third of the price it realized a few years ago. On the other hand, the Directors had to congratulate the proprietors upon an increase in the consumption of gas of 14 million feet upon the previous year. With reference to the Company's Bill now before Parliament, it had been read a second time in the House of Lords, and would go into Committee in the course of two or three weeks. He could not help congratulating the Company on the way in which the town had endorsed their policy in applying for a new Act; and he was sure the Directors would do their best to continue to deserve the goodwill of the town. The motion was adopted, and the maximum dividends were declared.

In their report for the past year, the Directors of the Dartmouth Gas Company congratulate the shareholders on the very satisfactory position of the Company's affairs. The consumption of gas greatly increased, partly owing to the severity of the weather in the first quarter of the year. After payment of the usual dividend of 13s. per share, there is a balance of £943 to be carried forward. At the annual meeting yesterday week—Mr. R. W. Prideaux presiding—the Manager (Mr. J. Tall) advocated the adoption, as an experiment, of automatic prepayment meters, and the provision of fittings by the Company in small houses. He said he believed that many householders would be glad to pay an increased charge for gas to cover the rent of the fittings, and that the revenue of the Company would increase if this idea were carried out.

The financial position of the Farnworth and Kearsley Gas Company is very satisfactory. The profit on the revenue account for the past half year is £3392; and the balance brought forward makes the amount available for division £6950. From this, the maximum dividends of 10 and 7 per cent. are to be paid.

The Gloucester Gas Company have had a steady increase in the sale of gas in the past half year; but the Directors complain of the depressed condition of the sulphate of ammonia market, though this, they say, has been to some extent compensated for by the improved value of tar. After providing for mortgages, interest, &c., the net profit for the six months amounts to £4961, from which the full dividends have been declared. These will absorb £3928.

The half-yearly meeting of the Great Wigston Gas Company was held at the works on the 25th ult., when dividends of £6 10s. and £4 11s., free of income-tax, were declared; leaving £187 to be carried forward. During the past six months, 60 new meters were fixed; the increase in the consumption of gas being 11½ per cent. The quantity of gas made was 11,256,900 cubic feet, of which 10,692,700 cubic feet were sold. Allowing 1 per cent. for the works and Manager's consumption, leaves the loss by leakage, &c., 4 per cent. The coal carbonized was 1031 tons 18 cwt.; the average make of gas being 10,900 cubic feet per ton. The heaviest make per day during the winter was 109,000 cubic feet, with two beds of retorts, fourteen in all. This make could be considerably increased, if required. The yield of sulphate of ammonia was good—being about 28 lbs. per ton of coal; but the price realized was very low. Coke has only fetched an average of 8s. 4d. per ton; 850 tons being sold during the year. The price of gas is 3s. 1d. to 3s. 4d. per 1000 cubic feet; but the bulk is sold at 3s. 1d. The plant at the works is equal to double the present make. Special thanks were given to the Chairman (Mr. A. A. Cooper), and also to the Manager (Mr. J. A. Harris).

The Lewes Gas Company made a profit of £1482 last half year; and after providing for interest on mortgages, &c., the balance of net revenue was £1804. In the report presented at the meeting of the shareholders last Wednesday, the Directors stated that they had sold by auction £2500 of additional 7 per cent. capital, which realized £3882. The Chairman (Mr. James Broad) congratulated the shareholders on the price obtained for this capital, and said it augured well for the Company. He also spoke of the efforts they were making to sell sulphate of ammonia in the locality; and mentioned, in regard to prepayment meters, that they had 80 fixed in the town. The incandescent gas-light, too, had attracted a few new customers who had hitherto used oil-lamps. The report was adopted; and a dividend of 5 per cent. for the half year was declared—the Chairman remarking that it was very satisfactory that they had at last got out of the old groove of 9 per cent. per annum.

The annual general meeting of the Londonderry Gas Company was held on Monday last week—Mr. W. Tillie, D.L., J.P., in the chair. The Manager and Secretary (Mr. J. Macnie) submitted the Directors' report, which was accompanied by the statement of accounts for the year ending Dec. 25 last. The report stated that, after providing for all charges, there was a profit balance of £4025, out of which the Directors recommended a dividend at the rate of 10 per cent., free of income-tax; leaving a balance of £425 to be carried forward. The increase in the sale of gas during the year was exceptionally large, and more than compensated for the decrease consequent on the discontinuance of the greater portion of the public lighting. The reduction in the price of gas represented about £870 in favour of the consumers. In moving the adoption of the report, the Chairman remarked that it was gratifying to observe the large increase in the consumption of gas, which he attributed to its extending use for heating and cooking and for laundry and engine purposes—the laundries being a new source of wealth to the city, benefiting business, and adding to the conveniences of private life. The reduction in price also contributed to this increase, and proved the soundness of the Company's business. The consumers not only received a bonus of about £1000, but the shareholders had the usual dividend, and were able to carry forward a small surplus to next year. Residuals, which contributed about one-third of the dividend, were not in so satisfactory a condition as was desirable. Tar had slightly improved; but ammoniacal liquor, owing to the unprecedentedly low price of sulphate of ammonia, was likely to produce less than formerly. The general position of the Company was excellent, and bore favourable comparison with other companies having a much larger consumption of gas. They were still menaced with the electric light; but for his own part he had no fear of it doing much harm to the Company. In other towns where the light had been adopted, the gas consumption had increased. He wished to refer to the subject of leakage, which was a good test of management. The Company's leakage had been reduced to a little more than 3 per cent. In this, as in many other respects, the conduct of the works reflected credit on the intelligence and attention of their Manager and those associated with him; and the shareholders would not be slow to recognize that they were fortunate in having such a Manager as Mr. Macnie. With regard to the automatic prepayment meter system, which had been recently adopted, it had made considerable progress, and, it was hoped, would spread more rapidly. Sir W. Miller seconded the motion; and it was carried unanimously. Votes of thanks were accorded to the Chairman and Directors, as well as to Mr. Macnie and the officials.

At the annual meeting of the Maldon (Essex) Gas Company, the Chairman (Mr. W. K. Digby) congratulated the shareholders on an improvement in the working. During the past year the sale of gas had increased—the amount realized being £2697; while £405 had been received for residual products. The profit carried to the net revenue account amounted to £913, which enabled the Directors to recommend the payment of a dividend at the rate of 36s. on the "A" shares and 12s. on the "B" shares. Mr. A. L. Clarke, the Company's Manager, had introduced many modern improvements during the latter part of the year, with the result that there had been a very considerable saving in the consumption of coal, as well as an improvement in the quality of the gas. The report was adopted.

The continued prosperity of the undertaking was the subject of

congratulation at the annual meeting of the Matlock Bath Gas Company, Limited. There had been a satisfactory increase in sales of gas, although it produced £120 less; this being attributable to the liberal reduction in price which the Directors felt justified in making to the consumers at the beginning of the year. The total expenditure was £2147; and the receipts £3023. A dividend of 10 per cent. was declared.

The Normanton Gas Company report a profit of £939 on the working of the December half of last year; but in order to pay a 10 per cent. dividend, £60 has to be withdrawn from the reserve fund. But for the extra payment in rates since the late re-assessment, it is stated that the fund might have remained intact.

The Chairman of the Richmond Gas Company (Mr. T. J. Carless), in moving the adoption of the report at the recent meeting of the shareholders, was able to congratulate them upon the result of the past half-year's working. They had, he said, been able to pay a full dividend and carry forward upwards of £4000, in addition to which there was a reserve fund of £5400. The consumption of gas still continued to increase; the quantity in 1895 being 13½ million cubic feet more than in 1894, or at the rate of 6½ per cent. They were now erecting a sulphate-house, in accordance with the requirements of the Government inspector. Upon the capital account, there had been an increase of £293 in the charges, and in the revenue account of £493; the latter being due to the large quantity of coal consumed. The carbonizing results compared favourably with the previous half year. The sale of gas had produced £14,767, which was an increase of nearly 4 per cent. The consumption of gas was still going ahead. They had no less than 200 prepayment meters in use; and more orders were coming in. The report was unanimously adopted; and dividends of 5 and 3½ per cent. were declared on the various classes of stock; making 10 and 7 per cent. for the year.

At the annual general meeting of the Sheppy Gas Company to-morrow, the Directors will have the gratification of reporting an increase "during the current year" of nearly 3½ million cubic feet of gas supplied; being the largest quantity ever sold in the district. An additional number of automatic prepayment meters have been fixed, and are working satisfactorily. Doubtless much of this improvement is the result of the efforts of the Company's Secretary (Mr. A. W. Marks). An increased return was secured for residuals, with the exception of ammoniacal liquor. Repairs and general renewals have been carefully carried out; but the increasing trade of the Company will shortly render a further large outlay necessary. The unreasonably heavy steam-roller in use in the town has again caused considerable expenditure and loss, on account of leakage, renewing service-pipes, and repairing mains, many of which, under ordinary circumstances, would not have required attention for some years. The increasing quantity of gas manufactured has for some time put a heavy strain on some portions of the works and plant, especially in the winter season. It is found that it will be prudent and economical to increase the storage and augment some other departments. The capital raised having been all expended, the Directors propose, after midsummer next, to call up the remaining £2 10s. each on the 1500 "C" shares. The receipts in the past year amounted to £10,614; the expenditure, to £7411—leaving a balance of £3203 to be carried to the profit and loss account. Interim dividends at the rates of 4, 10, and 7 per cent. per annum were paid to June last, amounting to £1523; and the balance of net profit available for the half-year's dividend to Dec. 31 is £1924. The Directors recommend the same rates as before.

According to the report submitted by Mr. C. R. Mead to the shareholders of the Sutton Gas Company at their recent meeting, the business made substantial progress in the past half year; and there was a larger return by £215, as compared with the corresponding period of 1894, for gas sold, notwithstanding the reduced price. The receipts for bye-products were £240 more. The amount available for division was £6704, from which dividends at the rates of 10 and 7 per cent. per annum have been declared.

The Directors of the Tonbridge Gas Company reported, at the recent annual meeting, that, notwithstanding the reduction of 2d. per 1000 cubic feet in the price of gas, and extra expenditure entailed by the exceptional frost early in the past year, the revenue account showed a profit of £2228. The balance on the profit and loss account was £3184, from which the Directors recommended the payment of a dividend of 10½ per cent. on the "A" stock, 7½ per cent. on the "B" and "D" stocks, and 5 per cent. on the "C" stock; leaving £2198 to be carried forward. They stated that the manufacture of gas showed the very satisfactory increase of 2,692,800 cubic feet, or 7·26 per cent., over the previous year; and they hoped to maintain this by the adoption of the "penny-in-the-slot" system. They expressed pleasure in announcing their intention to reduce the price of gas from 3s. 4d. to 3s. 2d. per 1000 cubic feet as from the 31st inst. The Manager and Secretary (Mr. J. Donaldson) reported that the works and plant were in a very satisfactory condition. The Chairman (Mr. J. Collins) moved the adoption of the report; and the proposition was unanimously agreed to. The dividends recommended were then declared. Thanks having been accorded to the Chairman and Directors, a similar compliment was paid to Mr. Donaldson, who was congratulated upon his successful introduction of several economical principles since his connection with the Company upon the resignation of Mr. Wilton, the former Manager and Secretary. Mr. Donaldson briefly acknowledged this kind recognition of his work.

In their half-yearly report, the Directors of the Watford Gas Company state that they have determined that the price of gas shall be reduced from 3s. 2d. to 3s. per 1000 cubic feet. The profit on the six months' working was £1853; and the profit and loss account showed a balance of £4520. Dividends of 13½ and 10½ per cent. have been declared.

Water Companies.

Some interesting remarks in reference to the affairs of the Camborne Water Company were made by the Chairman (Mr. Walter Pike) at the meeting of the shareholders a few days since. The Company, he said, were incorporated in 1867, and began to supply water in 1871. Their first dividend, paid seven years after the Company were incorporated, was 2½ per cent. Since that time, dividends of 4, 4½, 5 and 9 per cent. had been paid, until now they had the maximum dividend of 10 per cent.. Including that proposed on this occasion, dividends had been paid altogether to the amount of £15,209. There had been transferred to capital account from revenue £3880. The total profits had been £19,195. The capital account to June 30 was £24,531, to which had been added the cost on Boswyn stream account, £524.

The total receipts of the Leatherhead Water Company for the half year ending Dec. 31 amounted to £1481, being about £240 in excess of the corresponding period of 1894. The working expenses, including the cost of lowering the mains, amounted to £1007. Adding the profit to the sum brought forward, made a disposable amount of £724. From this, the interest on the debenture stock and a dividend of 2½ per cent. has been paid. It was stated by the Chairman (Mr. H. Rokeby Price), at the meeting of the shareholders, that the severe frost of last winter entailed an expenditure of something like £700. They had lowered 2000 yards of the mains; and they proposed to deal with 3000 yards this year. The Worthington engine has pumped 28 million gallons of water; this being 10 million gallons in excess of the corresponding period of 1894, at less cost.

The ordinary general meeting of the South Essex Water Company was held last Saturday week, at the Guildhall Tavern, Gresham Street. Mr. W. C. Fooks, Q.C., presided, and, in moving the adoption of the report, said that the well the Company were sinking at Romford was going on very satisfactorily. The accounts for the half year ended Dec. 31 showed a net profit of £5804; and, after payment of the interest on the debenture stock and setting aside £1000 to the depreciation and contingency account, there remained £4361 to the credit of the six months' working, which enabled the Directors to recommend dividends for the half year upon the ordinary stocks (1861 and 1882) at the rate of 5 and 3½ per cent. respectively. There had been an increase in the expenses, principally in rates and taxes. Mr. J. C. Amos seconded the motion, and it was agreed to. After the re-election of the retiring Directors, a special general meeting was held for the purpose of authorizing the creation and issue of additional ordinary stock. Mr Courtenay C. Fooks said that all the capital had been raised which was authorized under a resolution passed at a special general meeting on Aug. 29, 1890; and further capital was required for extensions and enlargements of the works. He then moved a resolution empowering the Directors to raise further capital not exceeding £25,000 of ordinary stock, and £25,000 of debenture stock. This was seconded by Mr. J. Haigh, and carried.

The half-yearly report of the South Staffordshire Water Company was noticed in the "Journal" for the 25th ult. When presenting it to the shareholders at their ordinary meeting, the Chairman (Mr. Frank James) spoke with gratification of the number of additional houses that had been connected to the Company's system (2006). The increase in water-rates was certainly satisfactory. They had received £46,070, as against £43,492 in the previous half year, and £42,551 in the corresponding period of 1894. The engine charges were £5215, as compared with £4700; but they had pumped during the half year 193 million gallons more water. On maintenance of works, they had spent £3270, against £2548. Adding together the two half years of 1895, they had spent £10,000 on maintenance, compared with £5000 in 1894. Not only had they in 1895 to incur all the damage caused by the frost, but they also took advantage of the water being low in the reservoirs to clean them out during the summer. This cost about £400. Such a thing had not been done for 30 years in some cases; and he did not think there could be more satisfactory evidence of the character of the water which they supplied than the condition in which they found the Stowe pool at Lichfield. Everything showed that the Company were in a sound, honest condition. Sir Henry Wiggin seconded the proposition, which was carried. A dividend of 5½ per cent. on the ordinary stock was declared.

TOTTENHAM AND EDMONTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Saturday week, at the Offices, Willoughby Lane, Tottenham—Mr. George Gripper in the chair.

The Secretary (Mr. James Randall) having read the notice calling the meeting, the Directors' report and the accounts, from which some particulars were given last week, were taken as read.

The Chairman said the report which the Directors had the pleasure of presenting showed that the Company were making good and satisfactory progress. To give the proprietors some idea of the advance in the business, he might state that in the half year ending December, 1894, the increase in the consumption of gas was 7·30 per cent.; in the six months ending June last, it was 10·57 per cent.; and in the past half year, it was 13·10 per cent. Taking the three half years together, these figures gave them an average increase of upwards of 10 per cent. The automatic meters (which had become an important point in their accounts, and also in regard to the amount of capital required for them) were working most satisfactorily; indeed, they found their great difficulty in connection with them was to keep pace with the demand. They had now 2658 of these meters fixed, which was an increase of 833 in the six months; and this was still going on. The saving in the price of coal to which he alluded at the last meeting had been considerably reduced by the bad price of sulphate of ammonia, which, during the greater part of the half year had really been unsaleable. There was a little more demand for it now; and they had sold a large portion of their stock, and hoped soon to get it cleared off. The price of sulphate was now only between £8 and £9 per ton; while a few years ago it was £13. In the report, the Directors referred to the need of further investments of capital. The business was growing so rapidly that, in the near future, they would require fresh capital. They had now under contract the erection of additional works for carburetted water gas, and some new purifiers; so that, possibly in the autumn, they would issue new capital. Coming to a pleasant feature in the report, the Directors had, he said, deemed it advisable to place the sum of £500 to the insurance fund, and £400 to the reserve fund, which left an available balance (including £1833 brought forward) of £9645, from which they recommended the dividends which would be proposed by Sir Henry Cartwright. He moved the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. Corbet Woodall), in seconding the motion, said he did not think he could add much to the Chairman's statement. The cost of the materials used in making gas had been reduced in the past half year, in comparison with the corresponding period of 1894, by about 5d. per 1000 cubic feet. On the other hand, the receipts from the residual products wiped out this saving almost exactly; so that the net cost of the materials was the same to the second point in decimals in the past half year as in 1894. There was no particular *kudos* in selling coke cheaply; but he did not know that the district did not gain some advantage from the fact that the Company were selling coke at a lower price than had been ruling for some time. In the past half year, sulphate had been reduced by about one-third of what it realized in the second half of 1894. The most satisfactory item in the accounts was the increase in the sale of gas. So long as this continued, they could face a very considerable loss such as that to which the Chairman had referred. A 13 per cent. increase in the consumption of gas in the half year was almost unexampled in the story of suburban or London gas companies. It had so happened, as the proprietors were aware, that the severe weather they had had in one or two past years had come after the shortest days had passed. If they had had the severe weather of the spring of last year about Christmas time, it would have put the Engineer and the works to the extremest possible tension in order to meet it. Coming as it did after the days had lengthened somewhat, it was very much to their advantage; and they were able to deal with it quite easily. As the Chairman had said, it was necessary to extend the works; and with such an increase as they had experienced, he was sure the proprietors would not grudge the expenditure of further capital.

The motion was unanimously carried.

Sir HENRY CARTWRIGHT proposed the declaration of dividends of 11½ per cent. per annum on the "A" stock and of 8½ per cent. on the "B" and "C" stocks. The proprietors, he remarked, had not only the satisfaction of having a dividend, but what was of great importance to them, they had a permanent and steady one. He also spoke of the necessity of taking into consideration the interests of the consumers as well as those of the proprietors in order to keep out competition from other illuminants.

Mr. J. WARREN seconded the proposition, which was agreed to.

Mr. E. SAWYER gave notice of a motion for the next meeting to the effect that the salary of the Secretary be considered with a view to its increase.

Mr. WALTER LOW moved a vote of thanks to the Chairman and Directors for their attention to the business during the half year.

Mr. H. D. ELLIS, in seconding the motion, said that if he might be allowed, he should like to refer to one matter to which allusion had been made by the Deputy-Chairman, and with which he was certain the proprietors would all most heartily coincide. Mr. Woodall had dwelt upon the growth of the business—the increases of 13 and 10 per cent. He (the speaker) believed he had occasion to say before at one of their meetings, and he would say it over again, that the most vital element in the work of a gas company was to develop the business of gas making and selling beyond anything else. They had the power in their hands to increase the price of the gas whenever circumstances compelled them to do so; and the possession of this was of immense importance. In the case of residuals, they had not that power. The price of residuals depended upon an infinity of circumstances which were quite outside the power of the Directors, and which they could not control. So long as they could develop the gas business, and sell 13 or even 10 per cent. more, they were rendering themselves independent to a large extent of the fluctuations in the price of residuals. He saw by the revenue account that, in spite of the flatness—"slump" he believed the Yankees called it—in residuals, they had actually earned the dividend in the half year. He had seen the accounts of many gas companies working in different parts of the kingdom; and he could not remember more than one of them that had earned its dividend in the past half year, and had not had to draw upon its undivided balance. He therefore thought their own Company had a very cheerful future before it.

The CHAIRMAN, in replying, said the Directors were resolved that nothing that was new, or was likely to improve the business, should pass by untested. Carburetted water gas had been a great advantage to them. They were able, by means of the plant, to produce gas of as good a quality, and at a smaller outlay of capital, than by the ordinary system. It would require an expenditure of £30,000 or £40,000 to accomplish on the old system what they were able to do by an outlay of £13,000 on carburetted water-gas plant. He quite endorsed the remarks made by Mr. Ellis on the subject of the residual products, and added that it was the determination of the Directors to make gas as cheap as possible to the consumers. Before concluding, he proposed a hearty vote of thanks to the officials and their staffs, observing that they all well deserved the praise of the proprietors.

Mr. RANDALL and Mr. W. H. H. BROADBERRY (Engineer) responded; and the proceedings then terminated.

HARROW AND STANMORE GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday last week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY and ENGINEER (Mr. J. L. Chapman) read the notice calling the meeting; and the report and accounts were taken as read. From these it appeared that the balance on profit and loss account was £2272, from which the Directors recommended the declaration of dividends at the rates of 7½, 7, and 5½ per cent. per annum on the various classes of capital, and 6 per cent. on the guaranteed shares.

The CHAIRMAN, in moving the adoption of the report, said the past half year was the first complete one since the amalgamation with the Stanmore Gas Company. The gas was now all made at Harrow, and all the accounts were paid to the amalgamated Company. In regard to the statement of accounts now laid before the shareholders, the same difficulty reigned over him as on the occasion of their last meeting The accounts would all necessarily be larger; and therefore he could not enter into them in much detail. In the items of expenditure, for instance, the amount spent on the manufacture of gas was £384 more; distribution, £171 more; and management, £178. On repairs and maintenance, £260 had been spent. This was a large sum for them; but it was one of the wisest expenditures they had ever made. Although they had 42 miles of mains extending over to Stanmore, with 7 miles between the two stations, their leakage was only 5 per cent. He recollected the time—an anxious time it was, too—when, at Harrow alone, the leakage was from 9 to 10 per cent. After talking the matter over with the Engineer, an inspector was appointed; and from then to now each half year the leakage had, he believed, become less and less, till before the amalgamation, for several half years, it was much below 5 per cent. Therefore, on receiving the complete return for the past half year, he was anxious to see what the leakage had been; and he was very gratified to find they had only had 5 per cent. Then, when he considered the temperature at which the gas was registered at the station meter, and also considered (so far as he could) the number of consumers' meters that were put in very cold places, and that the greatest consumption took place in the cold of the evening or night, when ordinarily the temperature would be lower by 10°, 20°, or even 25°, he could account for much of the 5 per cent. Now gas expanded $\frac{1}{493}$ part (or, say, $\frac{1}{500}$) for every increase of a degree in temperature; and it contracted in the same manner—being about 2 cubic feet per 1000 feet for every degree decrease in temperature. If, therefore, the temperature at a consumer's meter was 20° below that at which the gas had been registered at the station meter, there would be a loss of 40 cubic feet per 1000 feet. So that, while the consumer would be charged for 960 feet, the station meter would say he had had 1000 feet. Should it be 25° below, it would really be 5 per cent. Leakage there must ever be, however perfectly the pipes and mains were laid. Their distribution system at Harrow was, he thought, as near perfection as they could ever hope it to be. The expenditure in the half year had been £4776, and in the corresponding half of the preceding year it was £3936; so that they had spent £840 more. Turning to the opposite side of the account, he found that in the Michaelmas quarter, the increase in the revenue from gas was £408; and in the Christmas quarter, £844. In meter and stove rentals, there was an advance of £62. This looked bright and cheering. With respect to the residual products, excepting sulphate of ammonia, they had done very well. They had a little more profit on coke, breeze, and tar; but with respect to sulphate they, in common with all other gas companies, had lost. The revenue for the half year amounted to £7023, exceeding that of the preceding year by £1347. Their profit for the half year was £2247, as against £1739 in the corresponding period of last year. This profit would enable them to pay the guaranteed dividend of 6 per cent. on the Stanmore capital, the usual dividends on the Harrow capital, to pay off £100 from the suspense account, and to carry a fair sum to the next account. This result he thought would be as satisfactory to the shareholders as it was to himself. It would be remembered that, at the last half-yearly meeting, he compared the Lady-day quarter and the Midsummer quarter with preceding years; and he found in those two quarters they were doubling their business in 20 years. He had worked out in the same way the two quarters of the past half year. But they had not increased at so rapid a rate; and taking the whole year, the period in which the business was doubling itself would be fully 21 years. Then he wanted to know whether the increase was continuing. Comparing the Michaelmas quarter of 1894 and 1895, there was an increase of 473,000 cubic feet in Harrow alone, and in the Christmas quarter it was 860,000 feet. So that in the half year they had a total increase of 1,333,000 feet, or more than 9½ per cent. Taking the outside district—that was, Harrow-Weald, Sudbury, and Wembley—the increase in the half year was 239,000 feet, or more than 9½ per cent. Then with regard to Stanmore, they had sold in the six months 6,599,000 feet, which was an increase of 513,000 feet; or rather more than 4½ per cent. So that from whatever aspect they looked at their affairs, they were bright and satisfactory.

Mr. C. HORSLEY, J.P., seconded the motion.

The CHAIRMAN, replying to a question, stated that they had fixed about 80 additional prepayment meters in the past two months.

The motion was unanimously carried.

The dividends recommended having been declared,

Mr. HORSLEY moved the re-election of the Chairman, who retired by rotation from the Board. He remarked that he did not think Mr. Glaisher had ever missed being in the chair, except through illness, during the 25 years he had been connected with the Company.

Mr. A. H. BAYNES seconded the motion, which was agreed to.

On the proposition of Mr. A. F. PHILLIPS, seconded by Mr. J. T. RANDALL, the retiring Auditor (Mr. F. G. Fenton) was also re-appointed.

An Extraordinary Meeting was then held for the purpose of authorizing the Directors to issue £20,000 of additional capital, and to borrow £5000 on mortgage, or by the creation of debenture stock.

The CHAIRMAN said that, looking over the balance-sheet, it would be seen that all the capital, save the £40,000 authorized by the Act of 1894, had been expended. The capital account had been overdrawn by more than £4200; and the general balance-sheet showed that they were indebted to their bankers for £6300. It was essential that they should clear themselves; and therefore the Directors proposed that the shareholders should authorize them to raise £20,000 of capital and to borrow £5000. The shareholders might rest assured that the Directors would act with prudence in the expenditure of this money. He moved a resolution accordingly.

Mr. HORSLEY seconded the motion, which was at once unanimously carried.

The usual complimentary votes to the Chairman and Directors and to the Secretary and Engineer, concluded the proceedings.

Purchase of Additional Land by the Manchester Corporation Gas Department.—The Manchester City Council have agreed, on the recommendation of the Gas Committee, to purchase 5616 square yards of land (with cottages thereon), adjoining the Bradford Road gas-works, for £2075. This addition will make the total area of the station 53 acres.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Tuesday, at the Offices, 9, Queen Street Place, E.C.—Mr. A. J. Dove presiding.

The Secretary (Mr. Thomas Guyatt) read the notice convening the meeting.

The Chairman, in moving the adoption of the report and accounts for the half year ending Dec. 31 last (*ante*, p. 417), said he had no doubt the shareholders would consider them very satisfactory, since the Directors were able to pay the usual dividend of 7 per cent. on both classes of shares, to transfer £1000 to the reserve fund (making it £9000), and to carry forward £888.

Mr. C. Gandon seconded the motion, which was adopted.

A resolution having been passed transferring £1000 to the reserve fund and declaring the dividends,

The Chairman proposed the re-election of the retiring Director (Mr. Stephenson R. Clarke); remarking that he belonged to a family who had been old friends of the Company.

Mr. Gandon seconded the proposition, which was agreed to.

The Auditors (Mr. C. K. Butt and Mr. T. H. Cooke) were also re-appointed.

Mr. J. L. Chapman, in moving the usual complimentary vote to the Chairman and Directors, observed that the balance-sheet was a good one; and it improved every time it came before the shareholders. They could not therefore do less than heartily thank the Board for their management of the concern.

Mr. W. A. Hounsom seconded the motion; and it was passed.

The services of the Consulting Engineer (Mr. H. W. Andrews), the Engineer and Manager (Mr. John Gandon), and the Secretary also received suitable recognition.

THE LONDON COUNTY COUNCIL AND THEIR OFFICIALS.

The Dublin Corporation Unsuccessfully Seek the Aid of Mr. W. J. Dibdin.

Among the minutes submitted by the General Purposes Committee at last Tuesday's meeting of the London County Council was one which stated that the Deputy-Chairman had brought before the members a request made by Mr. V. B. Dillon, on behalf of the Dublin Corporation, that Mr. W. J. Dibdin, F.I.C., F.C.S., the Chemist and Superintending Gas Examiner of the Council, might advise and give evidence with respect to the Bill which the Corporation are promoting this session for the purpose, among others, of "adjusting" the city's relations with the Alliance and Dublin Gas Company. The Corporation, it was stated, were seeking powers for the testing of gas as in London; and, with a view to obtain the best evidence with regard to the sys'em adopted there, they desired to have Mr. Dibdin's assistance. Although, on previous occasions, the Committee had felt bound to recommend that requests for Mr. Dibdin's services should not be acceded to, they thought that, in the present instance (which was of a special nature), that request might, as an act of courtesy from the Council to the Dublin Corporation, be granted. They considered, however, the condition should be attached that Mr. Dibdin should receive no remuneration for the services so rendered. That any of the Council's permanent officials should receive payment for services rendered to other bodies or persons was, they pointed out, contrary to the declared policy of the Council, and to the terms upon which all appointments were now made by them. The Committee recommended that the request of the Dublin Corporation be acceded to on the condition stated. The report provoked an animated discussion, which was initiated by Mr. E. Boulnois, M.P. He emphatically declared that it was not in accordance with fairness that the brains of their Chemist should be exercised for the benefit of an outside body without his receiving any benefit or payment from it. Their officers, it was true, were engaged to devote their whole time to the service of the Council; but they were under no obligation whatever to give their time and their services to any other body. So far as he knew, Mr. Dibdin was receiving from the Council a very small salary—he believed it was £800 per annum. He (the speaker) did not think this was sufficient for a gentleman of Mr. Dibdin's ability and capacity; and therefore if he was called upon to render services outside those which he must necessarily give to the Council, he ought to be paid for them either by that body or by those who employed him. He moved that the report be referred back. The amendment having been seconded, Mr. R. Strong, the Chairman of the Committee, urged the special circumstances of the case as a reason why the recommendation should be adopted. Mr. R. M. Beachcroft saw no reason why a fee for Mr. Dibdin's services should not be paid by the Dublin Corporation to the Council. Mr. John Burns asserted that this was the seventh application made by Mr. Dibdin to be allowed to give evidence, against the often-expressed view of the Council that such requests should not be countenanced. He thought the Council ought to emphatically refuse to allow Mr. Dibdin to break through the standing order. At the same time, he admitted that it was unfair to ask him to do work for which he would not receive any remuneration. Lieut-Col. Rotton considered Mr. Burns was unfair to Mr. Dibdin; the inference to be drawn from his remarks being that their Chemist had been "touting" for work outside. He agreed with the suggestion that they should allow the matter to go back to the Committee for further consideration, and that the Council ought to receive from the Dublin Corporation some remuneration or recognition for Mr. Dibdin's services. Mr. T. H. W. Idris pointed out that, by not allowing Mr. Dibdin to undertake expert work, they had taken from him a large income, without any adequate recompense. He hoped justice would be done him by giving him full compensation. Other members having spoken, the amendment was put to the vote, and was rejected. The Committee's recommendation afterwards met with the same fate.

The Proposed Purchase of the Exmouth Water-Works by the Local Authority.—The Exmouth Water Company have informed the District Council that they do not wish to sell their undertaking or treat for its sale. The proposition, it may be remembered, emanated with the Council.

IMPORTANT SALES OF GAS SHARES.

An important sale of stock in various Suburban and Provincial Gas Companies was conducted at the Mart, Tokenhouse Yard, on Monday last week by Mr. Alfred Richards. By many electricians, the supply of gas may be regarded as a "decaying" industry; but, with Consols touching 110, those who are seeking good investments for their money look at it in a very different light, and they compete keenly for gas stock whenever it is put before them. Evidence of this has been frequently afforded at the sales over which Mr. Richards presides; and the latest furnished a very striking proof of the public feeling in this matter. One of the ordinary rooms at the Mart has generally been found large enough to accommodate the assembled investors. But on the present occasion the attendance was so numerous that a move had to be made to the largest room in the building; and even this was full to overflowing. With regard to the sale, the first item in the particulars was £370 of "A" stock of the Hornsey Gas Company, ranking for 10 per cent. dividend, but entitled under the sliding-scale to 11½ per cent. This stock was knocked down at £252 10s. per £100. Some "C" and "D" stock (7 per cent.) of the same Company fetched £175 per £100. A parcel of £120 of "A" stock of the Croydon Gas Company, the last dividend on which was at the rate of 14 per cent. per annum, was sold at the rate of £327 10s. per cent.; and £100 of "B" stock, earning 11 per cent. per annum, was purchased for £260. "B" stock of the Wandsworth and Putney Gas Company, on which a dividend of 12½ per cent. per annum has been paid, realized £317 10s. per cent.; a small parcel of "D" stock, carrying 11 per cent., was knocked down at the rate of £300 per cent. Some original shares (£5) in the West Ham Gas Company, the last half-year's dividend upon which was at the rate of 9½ per cent. per annum, fetched prices ranging from £11 17s. 6d. to £12 5s. each. Fully paid £10 "B" shares (7 per cent.) in the Hampton Court Gas Company found purchasers at £17 15s. each. Ordinary £10 shares (fully paid) in the Barking Gas Company, the last dividend on which was at the rate of 7 per cent. per annum, fetched £16 5s. and £17 10s. each; and some similar shares, on which £1 10s. only had been paid, were sold for £4 10s. apiece. Some 4½ per cent. debenture stock of the Herne Bay Gas Company went at 106 per cent.; and for some fully-paid £5 shares, carrying 6 per cent. dividend, £7 and £7 10s. apiece were paid. The Southend Gas Company's new ordinary £10 "D" shares carrying 7 per cent. per annum, but entitled, under the sliding-scale, to 8½ per cent., if earned, fetched £15 15s. and £17 2s. 6d. each. A parcel of 50 original shares (£5) in the Sunbury Gas Company, bearing a dividend at the rate of 4½ per cent. per annum, was purchased at £6 per share. A few fully-paid £25 shares in the Chelmsford Gas Company, on which the last dividend paid was at the rate of £4 4s. per cent. per annum, were sold for £29 each. The final item was a parcel of ten fully-paid £10 shares in the Enfield Gas Company, earning 7 per cent. dividend, which were secured at £17 10s. apiece. This transaction closed a highly interesting sale, from many points of view; but it brought out prominently one fact—viz., that gas stock, as an investment, is tending to a 4 per cent. return. This was specially the case with what may be called the outside Companies.

A noteworthy sale of gas stock also took place at the Mart on Thursday last, by Messrs. Fox and Bousfield. On that occasion, some consolidated stock of the Commercial Gas Company was disposed of at 336 per cent.; and some original £10 "A" shares in the Eastbourne Gas Company, for £32 each.

SMETHWICK CORPORATION GAS SUPPLY.

The annual report and statement of accounts in connection with the Gas Department of the Smethwick District Council for the year ended Dec. 31, 1895, prepared by the Secretary, Mr. W. J. Sturgess, has lately been issued. It shows a remarkable expansion in the amount of business transacted. The indebtedness of the gas undertaking now stands at £161,241, as compared with £161,839 at the end of 1894; the reduction being due to the annual instalment of £598 repaid during the year. There is a highly satisfactory increase in the income from the sale of gas, which exceeds that of the preceding year by £1893. The total quantity of gas consumed was 176,516,300 cubic feet; being 15,573,500 cubic feet in excess of that sold in 1894, or an increase at the rate of 9·7 per cent. This rate of development has never been approached since the commencement of the gas undertaking. A large portion of the increased consumption—12,543,900 cubic feet—has arisen in the accounts of manufactories, &c., charged at the 2s. 6d. rate; while prepayment meters have taken 1,534,200 cubic feet—the remaining 1,495,400 cubic feet being distributed over the smaller consumers and the public lighting. The number of meters in use on Dec. 31 was 2701, including 271 prepayment meters, as compared with 2393 at the end of the previous year. There is a falling off in the income from residual products, and an increase of £512 in the charges incurred for the distribution of gas, which amount to £1395, against £883. The total expenditure for the year's trading is £18,706, or 20s. 4·649d. per ton of coal carbonized, as compared with £17,921, or 22s. 2·166d. per ton. The gross profit is £10,518; being £968 more than in the year 1894. The charges for interest on loans and the redemption of debt vary very slightly from those of the previous year. After meeting these charges, there is a balance of £2595, against £1609 for the preceding year. It has been arranged to transfer £1000 to the general district fund account; and the balance to be written off the regenerative plant account will absorb a further sum of £1338—leaving £257 to be carried forward. The total amount to the credit of the sinking fund at the end of the year was £18,147, which includes a sum of £5460 transferred from the suspense account by order of the Local Government Board. The usual comparative and analytical statement of the accounts and working results for the years 1894 and 1895 is appended to the report. It is considered very probable that a recommendation will be submitted to the Council for a reduction in the price of gas to the extent of 2d. or 3d. per 1000 cubic feet.

THE GUILDFORD CORPORATION AND THE GAS COMPANY'S BILL.

Purchase Powers Required.

The Bill which is being promoted in the present session of Parliament by the Guildford Gas Company has been under the consideration of a Committee of the Guildford Town Council; and, as a result, they have been seeking to obtain concessions from the Company on certain points. The first question raised by the Committee has reference to the price to be charged for gas and the shareholders' dividends. The Company are proposing that, under the sliding-scale, the dividend of 5 per cent. shall rise or fall 2s. 6d. per cent. for every penny reduction or increase below or above a standard price of 3s. 10d. per 1000 cubic feet. The Directors, in deference to the objections of the Committee, are prepared to assent to a provision that there shall be no increased dividend over the 5 per cent. so long as the price of gas exceeds 3s. per 1000 cubic feet. The Committee, however, are not satisfied with this. They think that the standard price of gas should not be more than 3s. 6d.; and that no increased dividend should be payable until the price is reduced below 3s., which is the net price now charged. The Company have agreed to increase the illuminating power of the gas to 15 candles, and to give a uniform pressure of 8-10ths, instead of 8-10ths at night and 6-10ths in the day. The Committee also think it desirable that the Town Council should have power to purchase the undertaking on fair terms within a reasonable period. This is strongly objected to by the Directors; but the Committee consider that, if the Corporation have to appear in opposition to the Bill, they should press for this power. At their last meeting, the Town Council adopted a recommendation of the Committee that, as they had been unable to obtain a satisfactory arrangement from the Directors of the Company, a petition should be presented in opposition to the Bill.

THE IPSWICH GAS COMPANY AND THEIR STAFF.

Presentation to Mr. Jolliffe.

On the invitation of the Directors of the Ipswich Gas Company, the members of the staff dined together at the Great White Horse Hotel last Saturday week. The head of the table was taken by Mr. G. A. Biddell, the Chairman of the Company, and the vice-chair by Mr. D. Ford Goddard, M.P. After the loyal toasts, Mr. Goddard submitted the toast of the evening—"Success to the Ipswich Gaslight Company." He remarked that it was no unhappy thing for one in whose family for three generations the management of the undertaking had been, to wish success to the Company. No department of the concern could be described as unsuccessful. What commended itself to him was not that success depended entirely upon one man, or a certain amount of money, but that it was dependent from beginning to end upon the exertions of all those who were concerned in it. There must necessarily be the leading spirit; and the Company were exceedingly fortunate in having at their head one who was so thoroughly conversant with every feature of this great industry. But while they must owe a great deal to the initiative of their Manager and Engineer, in no less degree were they dependent upon the fidelity and attention of every single person concerned in the work. Mr. W. Alexander, the oldest member of the directorate, responded. Mr. J. T. Jolliffe, the Engineer, proposed "The Health of the Board;" observing that the best testimonial to the work of the Directors was the fact that within the last seven years the business had increased 50 per cent. The toast was enthusiastically drunk. Subsequently, Mr. R. F. Paternoster, the Company's Cashier and Accountant, submitted "The Health of the Secretary and Engineer." As a staff, he thought they might congratulate themselves that not only had they an admirable Board of Directors, but an energetic, kind, and courteous Secretary and Manager. Addressing Mr. Jolliffe, he said it had occurred to the staff that the dinner might be a fitting opportunity of expressing their great esteem; and to ask his acceptance of a small present, with their sincerest wishes for his and his wife and family's future. [The gift consisted of a handsome gilt and oxidized silver filigree inkstand, a pair of candlesticks and two vases to match, composing a splendid set.] The toast was drunk with musical honours. Mr. Jolliffe, in reply, said he was deeply sensible of their kindness. He had under him a staff to whose faithful co-operation he owed much.

THE LEEDS CORPORATION GAS COMMITTEE AND THEIR MEN.

On behalf of the Leeds Corporation gas workers, a manifesto was issued last week in which the reasons given by the Gas Committee for their decision upon the demands made by the men for certain advances in wages and alterations of the hours of labour were traversed. The Committee, says the manifesto, base their refusal to comply with the demands on the grounds that, taken in comparison with the wages and conditions in operation in various other towns, Leeds compares very favourably. The contention of the men is that no absolute comparison can be made; the conditions varying so much in each town that only an approximate idea can be formed for comparative purposes. Furthermore, they think that only the large towns should be selected if comparisons are to be drawn. The figures, as supplied to the Press by the Gas Committee, are said to be misleading. They state that a stoker's wages average, with Sunday labour, 37s. 6d. per week; but they omit what the men regard as an all-important fact—that since 1890 every effort has been made by the responsible heads of the department to reduce Sunday labour in every possible way. It is doubtful, says the manifesto, taking the year through, if the men work one Sunday in seven; so that if the total of 30s. per week is taken, a truer average will be struck. Newcastle pays 5s. 6d. per shift, with 1s. 6d. "good time" money; and although no extra pay is allowed for Sunday work, they receive from 40s. to 42s. 6d. per week. The London rates vary from 40s. 10½d. to 42s. 9½d.; the rates per shift ranging from 5s. 4d. to 5s. 7d. Birmingham, paying 5s. 3d. per shift, shows an average of 38s. 1d. weekly. It is pointed out that, as the storage capacity of Leeds has been so greatly increased of late, it is certain that Sunday labour will be still further decreased. Since 1890, the stokers have had to carbonize 60 cwt. per man per shift, instead of the 55 cwt. previously; but if a statement made by a member of the Committee is correct, that previous to 1889 the quantity carbonized was 47⅛ cwt., then the total extra work amounts to 12⅛ cwt. In addition the coal is now weighed, so that any deception is impossible. Take, again, the case of the enginemen, 5s. per shift of eight hours was asked for these men, with time-and-a-half for Sunday labour. The authors of the manifesto fail to see why enginemen and boilermen should not have the benefit of extra pay for Sunday work equally as well as any other class of Corporation workmen. The Committee's "concession" gives them the eight-hour day, but abolishes boilermen, and states that enginemen will in future have to attend to their own boilers. The concluding paragraph of the document is an appeal for the sympathy and support of the public.

ELECTRIC LIGHTING NOTES.

Several provincial electric lighting companies have issued their accounts; but space will not permit of the publication here of more than a few general figures relating to two or three of the principal undertakings. According to the annual report of the Birmingham Electric Supply Company, electric lighting in the city is making steady headway. The total number of 16-candle power lamps, or their equivalent, on order on Dec. 31, 1894, was 12,138; on Dec. 31 last, it was 18,199; and since the close of the financial year, it has been brought up to 19,401. Including a balance of £1001 brought forward, the amount of net profit for the year is £6570, from which a dividend of 4 per cent. is recommended by the Directors. The expenditure on capital account during the year was £50,537. The Hove Electric Lighting Company report a profit on the past year's operations of £2562, compared with £1243 in the preceding year; and a dividend of 4 per cent. is proposed. The progress of electric lighting in Scarborough is considered to be satisfactory by the Directors of the local Company. New customers to the number of 52, and the equivalent of 2285 8-candle power lamps, have been connected during the past year; making a total of 235 customers and 12,788 8-candle power lamps. Electric energy to the amount of 141,101 units was supplied, at a gross revenue, including meter-rent, of £3613. Deducting from this the expenses, there remains a balance of £937.

The working of the electric lighting undertaking of the Lancaster Corporation in the past year has resulted in a loss of about £500. This is practically equal to a penny on the rates, and is attributed to a reduction from 7d. to 5d. made some time ago in the price of current. The business, however, has increased from 46,000 to 58,000 units; but this is not regarded as satisfactory.

Alderman Lowe had a disagreeable task to perform at last Wednesday's meeting of the Burton-on-Trent Town Council, in informing his colleagues as to the results of the past year's working of the electric lighting undertaking. Briefly stated, the expenditure was in excess of the total receipts, and showed a loss of £292. The total capital outlay on the works was £28,634; and when the interest on this was paid, the total loss amounted to £1860. There are only 64 customers on the books; and Alderman Lowe is afraid that, until this number has been considerably augmented, the Council will continue to have this unpleasant drain upon their exchequer.

The members of the Worcester Town Council must be a set of men who are easily pleased, if they are "pleasantly surprised"—as it was predicted they would be by Alderman Williamson—by the result of the working of the electricity supply department during the past year. The accounts have now been issued. They show first that, of the £55,096 capital authorized, £52,225 has been spent. On the revenue account, the outlay has been £3057; and the total income gives a balance to the good of £196. But when the net revenue account is examined, it appears that there is a deficiency of £1443 on the year, after allowing for interest and sinking fund. Another statement shows that the total quantity of electricity generated was 348,251 units, and that the quantity not accounted for of this by sale or use is 92,384 units. The water power which formed such a prominent feature in the scheme, and of which so much was made when the generating station was started, did not, during the past year, "come anywhere near" its calculated value; and from the end of May to November, it was necessary to run a portion of the day on steam only.

The Morecambe District Council have been authorized by the ratepayers to carry out a provisional agreement for taking over the undertaking of the local Electric Light Company, which (as stated last week) is at present in liquidation. The total cost of the installation for public and private lighting is estimated at £16,000, inclusive of £3950 to be paid for the existing mains.

Alderman Sir John Turney asked the Nottingham Town Council yesterday week to grant the Electric Lighting Committee £40,000 for the purpose of extending their works. In support of his request, he stated that when they commenced supplying current on Sept. 19, 1894, they had only 35 customers on their books, equal to about 2590 8-candle power lamps. Now they had 202 customers, or 16,516 8-candle lamps; and they had nearly five miles of cables in the streets. The loan which was raised for the starting of the works amounted to £45,000; and they had had to trespass on their finances to the extent of £5000. The Council acceded to the application of the Committee.

The Salford Town Council are applying to the Local Government Board for sanction to the borrowing of £5000 required for electric lighting purposes.

The Town Clerk of Blackpool has received instructions from the Town Council to take the necessary steps for borrowing £30,000 for electric supply extensions and improvements.

The parish of St. Mary, Islington, entered upon its electric lighting career last Wednesday, when the Lord Mayor of London, with the Sheriffs and officials, attended in full state to open the central station.

All the local Members of Parliament were present; and the proceedings passed off with unanimity—everybody complimenting everybody else. Certainly the installation is a wonderfully complete one; and the Chief Electrical Engineer (Mr. Albert Gay) is to be congratulated on the fact that the enormous plant was erected entirely under his direction, and without the assistance of any expensive consulting engineer. The system adopted is the high tension alternating current transformer system; and four engines and dynamos are employed, capable of supplying 15,000 lamps of 8-candle power each. Up to the present, the Committee own to an expenditure of more than £80,000, of which about £25,000 is for buildings and £22,000 for plant. There are now 14 miles of mains laid, and 98 arc lamps (of the Crompton-Pochin type) erected. It is interesting to note that the greatest precautions have been taken to obviate any chance of explosion in the conduits; and what is believed to be a thorough system of ventilation is adopted, by means of a current of air passing in at the ventilators and out at the tops of the columns of the arc lamps, at which point a fine gauze door is fixed to prevent any ignition at the arc. The speeches, both at the opening function and at the banquet, were of the usual convivial and hopeful character; and one or two notes thereon may not prove uninstructive. The Chief Engineer was naturally most enthusiastic. He said that the undertaking showed every element of success; there were more applications for current than the Vestry could supply; and possibly another 1000-horse power would have to be added to the machinery. "Therefore, before long, the Committee would be asking for more money." This remark was received with laughter. Such extra expenditure he was sure would before long come back to the parish a hundredfold. Although the initial scheme was complete, it was only a small part of a great undertaking. But if the Vestry gave him half a chance, he would guarantee that it would be a success. He admitted that the work was not perfect; but he contended that there was the making of a perfect installation, &c. The Vestry will charge 5d. per unit for public lighting; and 7d., on a sliding-scale, for private lighting. After the banquet, Mr. S. Lambert, the Chairman of the Islington Electric Lighting Committee, was presented with a purse of gold and an illuminated address; and he modestly acknowledged the compliment. So now the ratepayers of Islington have put their hands to the plough and cannot turn back. The undertaking has started with the usual promises and anticipations of future success, as so many similar ventures have done before; and time alone will show the wisdom of the step. At the first meeting of the Islington Vestry after the inauguration of the electric light installation, the new illuminant failed to act. The Board-room was suddenly plunged in darkness, and the gas had to be lighted before business could be proceeded with. A deputation of parishioners was present; and it is to be hoped that they were duly impressed by the occurrence.

The Champion Incandescent Gas-Lamp Company, Limited, has been registered with a capital of £15,000, in £5 shares, to adopt and carry into effect certain agreements, and to carry on business as manufacturers of, and dealers in, mantles for lighting by means of incandescent gas or oil.

The Fatal Explosion at the Hyde Gas-Works.—The Coroner's investigation into the circumstances attending the death of the old lady who was injured by the accident at the Hyde Gas-Works on Jan. 27 (*ante*, p. 352) resulted in a verdict to the effect that the fatality was due to severe burns caused by an accidental explosion.

The Ilfracombe Gas Bill.—At a meeting of the Ilfracombe District Council last Tuesday, a letter was received from the Commons Preservation Society, stating that they intended to oppose the Bill which the Ilfracombe Gas Company are promoting, and asking if the Council would join them. The Chairman (Mr. W. Walters) remarked that the opposition appeared unnecessary. The Council had approved of the present Bill, which would not unduly interfere with Hele Beach, nor would it in any way affect the scenery of the district. It was decided to present a petition in favour of the Bill. A parish meeting has been held, at Combmartin, for the consideration of the same matter. Mr. J. P. Ffinch, the Solicitor to the Ilfracombe Gas Company, and Mr. Ball, the Secretary, attended the meeting, and explained the provisions of the Bill and the position of the Company. It was suggested that a time-limit clause should be inserted in the Bill to the effect that the parish shall be at liberty to supply gas if the Company fail, within a period of eight years from the passing of the Bill, or four years from the time the Company commence operations under the Act, whichever time first expires, to carry a main for the supply of gas for public and private purposes as far as High Cross, Combmartin.

The Croydon Gas Company and the Gas Supply to Cane Hill Asylum.—At the meeting of the London County Council last Tuesday, the Asylums Committee presented a report with reference to the supply of gas to Cane Hill Asylum. Hitherto the gas has been purchased under agreement from the Croydon Gas Company; the present rate being 2s. 8d. per 1000 cubic feet. The Company have recently stated that the lowest rate at which they can supply, on a five years' agreement, is 2s. 8d. per 1000 feet, payable quarterly, with an allowance of 5 per cent. off each quarter's account, provided such account be paid within one calendar month; and whenever the price to ordinary consumers in the district is reduced, they will make a corresponding reduction in the charge to the Asylum. The Committee stated that the cost of the gas manufactured at Banstead, Colney Hatch, and Hanwell Asylums is between 1s. 5d. and 1s. 6d. per 1000 cubic feet, on an annual consumption at each place of 16 million feet. The Asylums Engineer calculated that, by manufacturing the gas on the estate, the gas bill would be reduced by £550 per annum, if not more. The cost of the buildings and plant required to produce 16 million cubic feet per annum was estimated at £9000, and the erection of the buildings would be carried out by the Asylum workmen. If the Council sanctioned the necessary expenditure, two years' notice would be given to the Company to terminate the existing agreement. The Committee accordingly recommended that, subject to the usual estimate being submitted by the Finance Committee, they should be authorized to expend £9000 for the provision of the necessary buildings and plant. The report was agreed to without discussion.

METROPOLIS WATER SUPPLY.

The London County Council and the Water Question.

At the Meeting of the London County Council last Tuesday—Sir A. Arnold in the chair—the Joint Parliamentary and Water Committee presented a report on the subject of the Water Transfer Bills suspended from last session. They reported that the second reading of the Chelsea, East London, Grand Junction, Kent, New River, and West Middlesex Water-Works (Transfer) Bills, which had been kept alive by the Council's resolution on Feb. 18, had been adjourned until March 13; the Bills promoted by the Metropolitan Water Companies being also postponed to that date. The Committee had most carefully considered what action should then be taken, and had come to the conclusion that they must give a certain discretion to the members in charge of the Bills, seeing that circumstances might arise which the Committee could not at present forecast. An important factor was, of course, the probability of the Government making a declaration of policy on the water question. The Committee pointed out that the Council would always be able to take such subsequent action as they may think best, in view of the circumstances that might arise—retaining as they did full control over the Bills. But it appeared to the Committee desirable, from every point of view, that the Council should give the necessary authority to move the second reading. They, therefore, unanimously recommended—"That the members in charge of the Bills be authorized to move the second reading of the Chelsea, East London, Grand Junction, Kent, New River, and West Middlesex Water-Works (Transfer) Bills." The Committee went on to state that last year considerable technical difficulty arose as to the Bill for raising the money which would be required for the purchase of the water undertakings; and the Committee were of opinion that the simplest method would be that the matter should be dealt with by the Committee considering the Transfer Bills. They therefore recommended—"That the members in charge of the Transfer Bills be authorized to move an instruction to the Committee of Parliament to which the Bills may be referred, providing that, in the event of a transfer of the Water Companies' undertakings being sanctioned by Parliament, the Committee should take into consideration the terms on which the money should be raised for the purpose of carrying out the purchase, and should have power to make the necessary provisions in the Bills."

Lord Onslow asked the Chairman of the Committee (Mr. T M'Kinnon Wood) to take back the report.

Mr. Wood declined to do so.

Lord Onslow then moved that the consideration of it be adjourned for a week.

On a division, the amendment was lost by 59 votes to 47.

Lord Onslow was about to move a further amendment, when he was ruled out of order.

Sir J. Lubbock thereupon moved it, as follows: "That, in order to maintain the position of the suspended Bills, the members in charge of the Bills be authorized to move their second reading, with a view to further adjournment." He said that, when the Moderate members of the Committee agreed to the recommendation, they did not realize that, if the second reading took place, the Bills would go to a Select Committee as a matter of course. He considered that the best plan to adopt would be to agree to a further adjournment of the Bills when they came up on the 13th. The effect of the amendment would be, not to destroy the Bills, but merely to postpone them.

Mr. C. A. Whitmore, M.P., seconded the amendment.

Lord Tweedmouth said the whole object of the opposition was to put back the Bills. Lord Onslow had apparently discovered that the Government had made up their minds with regard to their water policy, and had been warned that it would not be convenient to give the death-blow to these Bills. It seemed to him that the Council should, if necessary, be prepared to run their Bills against the one promoted by the Government. He hoped, at any rate, they would back up the decision arrived at unanimously a week or two ago, and proceed with the second reading.

Mr. J. Stuart, M.P., said the Council had allowed the Bills to rest in order to give the Government an opportunity of showing its position. In his opinion, the legislation proposed by the Council was the only kind capable of being brought to a good conclusion. The Government would have to bring forward its own scheme. If it was a scheme of purchase, and uncertainty of the source of future supply, then they would find members on their own side of the House as much against their policy as the Council, and no more would be heard of the scheme. He urged the Council to act in accordance with the recommendation of the Committee.

Lord Onslow, in supporting the amendment, declared that Lord Tweedmouth had made a speech which would be the death-blow of the Bills. He (Lord Onslow) and those who were with him had never spoken in that chamber when they had not stated that their policy was to keep the Bills suspended. He believed this to be the right policy. Lord Tweedmouth had said that he (Lord Onslow), knowing of the Government's proposals, had shown a change of front. He declared to the noble lord that he (Lord Onslow) had not the slightest knowledge of what the Government were going to do; but he ventured to state that whether it came at the hands of the Government or from those responsible for the policy of the Water Companies, a death-blow would be dealt to the Bills if they were brought up for second reading on the 13th in the manner proposed.

Mr. Wood said the greatest misapprehension had been shown by Sir John Lubbock when he said the resolution meant the end of the Bills. It did not prevent the member in charge of them from adjourning them if the Government showed him good reason for doing so. He hoped the Council would send their members to Parliament armed with proper powers.

On the amendment being put to the vote, it was carried by a small majority; but on a division it was lost by 57 votes to 37.

Water-Works for Fowey.—Ten tenders for the works of water supply for Fowey were received by the St. Austell District Council. The amounts ranged from £4405 to £3110. The Council accepted that of Mr. J. A. Parkinson, of Golant, for £3397.

EXTENSION OF THE EASTBOURNE WATER-WORKS.

Mr. F. A. Currey, the Secretary of the Eastbourne Water Company, has forwarded a letter to the Eastbourne Town Council in which he states that, in accordance with the request expressed by the Council to the Duke of Devonshire, he was instructed by His Grace and the Directors of the Company to furnish the following information as to the works the Company are carrying out with regard to the water supply of the town: The works at Holywell for obtaining a new source of supply were commenced on the 26th of October last, and have been carried on night and day without interruption since the 16th of November, with the result that headings to the extent of 660 feet have been constructed, and a main pipe has been laid from Holywell to Meads Hill reservoir. A temporary engine capable of pumping 300,000 gallons per 24 hours to the high-service reservoirs has been erected, and is at work. The works at the headings will be continued. A much larger quantity of water than that above mentioned having been met with, a permanent engine, capable of lifting a million gallons per 24 hours has been ordered. The Company are advised by Dr. E. Frankland, F.R.S., that the water is of the most excellent quality for dietetic purposes. The boring at the Bedford well, with the object of obtaining a supply of water from the greensand, which was commenced on Nov. 1, 1895, has now reached a depth of 365 feet; but it is still in the gault, and has not yet penetrated the lower greensand. It is hoped that, when this stratum is reached, a supply of excellent water may be obtained for the use of the town. The works above referred to, together with the additional powers which the Company are now seeking from Parliament, will, it is confidently anticipated, enable them to ensure to Eastbourne and the district generally an excellent supply of water for many years to come.

THE LUTON WATER COMPANY AND THE CORPORATION.

At the Fifty-sixth Half-Yearly Meeting of the Luton Water Company, held last Wednesday under the presidency of Mr. C. Mees, the Chairman, some interesting statements were made upon the recent negotiations with the Corporation in regard to the purchase of the Company's undertaking, to which reference has been made in recent numbers of the "Journal."

The report presented by the Directors showed a balance of net profit for the half year ended Dec. 31, 1895, amounting to £2555, as compared with £2387 earned in the corresponding period of 1894. With the previous balance of £184, and £32 interest on investments, and deducting Directors' and Auditors' fees, the sum of £2705 remained available for distribution. The Directors recommended full dividends of 10 per cent. on the original shares, and 7 per cent. on the 1880 issue, and also a further payment of 2s. 6d. per original share for arrears of dividend. The sum of £150 was added to the renewal and contingency fund, and £94 carried forward. The Engineer reported that the works, mains, &c., had been fully maintained; and that the engines, pumps, and boilers were all in good working order. The Company's Analyst reported the water as of good quality; and the Analyst to the Herts County Council also said the water was very pure.

The Chairman, in moving the adoption of the report and accounts, said the latter showed that the revenue was gradually and steadily increasing—a fact on which the shareholders were congratulated.

Mr. Crouch seconded the motion; and it was carried unanimously.

The retiring Directors and Auditor were re-elected; and Messrs. Cooper were re-appointed Accountants.

The Chairman said the Directors thought it would be wise to make a few remarks upon the negotiations between the Company and the Corporation. It appeared that the result of the ratepayers' meeting on Feb. 4 summarily put an end to the negotiations; and the utility of further discussing the matter with a representative body so manifestly lacking support from its constituents, was not very clear. The first conference between the Directors and the Council was arranged eighteen months ago. It was agreed that the Company's position was such as to render it probable that terms might without difficulty be settled for carrying out what on all hands was acknowledged to be desirable in the general interests of the town. The Bill then before Parliament for transferring a Water Company of almost identical capital, and earning its maximum dividends, to the Local Authority at Swindon, suggested terms which the Directors considered they could recommend to the shareholders for acceptance—a consideration in the form of a 3 per cent. stock to yield a return equivalent to the dividends now being paid for a term of about 55 years. This, in the Swindon case, was altered in the Act to an annuity of the same amount, redeemable at the end of the term on 25 years' purchase—a concession to the Local Authority of some eight years' purchase. This modification the Directors were willing to accept. The accumulations of revenue on the contingency fund were to remain in the hands of the Company; and the stores were to be taken over at a valuation. These were the terms which, after repeated discussions and considerations by the Special Committee of the Corporation, were finally recommended for adoption by the Town Council in January, but which failed to obtain ratification by the ratepayers. So far, therefore, as the Directors were concerned, the oft-raised question was at an end; and they had received official notification that all orders and minutes made by the Special Committee had been discharged as null and void. Personally, he quite endorsed the feeling that the negotiations were at an end, as far as the Company were concerned. He came to this conclusion when he read the reports of the language used at the ratepayers' meeting, and the figures turned inside out in such a way that he found it morally impossible for them as a Board to negotiate terms at all with the Corporation after the ratepayers had met. One suggestion was that the town was going to pay £300,000, and he did not know how many more pounds, for the property. When a councillor could get up and make statements of this description, he thought it was about time they took into consideration a few sterling facts which he did not give. The gentleman referred to did not say one word about the earnings of the Company. If he put down the earnings with the sum he calculated, he would find the one would overbalance the other to an appreciable degree. He was convinced that, considering the prosperous condition of the Company, if the Corporation had acquired the works, and bought up the stock as it came into the market, they would have come into complete possession of the undertaking in thirty years without costing the ratepayers a sixpence, provided the affair had been managed as it ought to have been. He made this statement because of the outrageous remarks that had been made. He thought the Directors came to a very sensible conclusion when they decided not to entertain any further negotiations.

Mr. J. R. Marsh, a member of the Council, said that, though he did not agree in the slightest with the figures quoted, he thought they had been given in good faith. In consequence of the decision of the town's meeting, the Council could take no further action. But he would remind them that, according to clauses 26 and 27 of their Act, the town had power to acquire the undertaking by arbitration on the assent of two-thirds of the ratepayers. Unfortunately, many people thought arbitration meant confiscation. He considered that the real reason why the ratepayers rejected the scheme was simply that they did not understand the *bona fides* of the Directors in making the offer. Many of the ratepayers believed that there was something behind, and that the Directors wanted to get rid of the Company. The offer was really too genuine. If any further negotiations took place, they must come, under the Act, from the ratepayers themselves. Anybody present at the ratepayers' meeting must have clearly seen that those in favour of the purchase had very much the best of the arguments.

The Chairman said the Directors were perfectly aware of the arbitration clause. As a shareholder, he should be quite willing to sell on those terms; but he must say positively that, as a ratepayer, he would very seriously object. The Directors knew very well what they were offering; and no arbitrators in the country would ever go in for confiscation. The undertaking would be priced at a fair valuation.

Mr. G. Sell (the Town Clerk) desired to say that the majority representing the Corporation were unanimous in dealing with the Company for the acquisition of their property. Under no circumstances did they think there was anything behind, or any chicanery going on. The Corporation as a body—he said it emphatically—were honest and straightforward in their endeavour to acquire the undertaking. He had not the slightest doubt that in a short time negotiations would be again opened up, and that the Council would eventually become possessed of the undertaking.

The meeting concluded with the usual votes of thanks.

The Financial Position of the London Water Companies.—In view of the forthcoming Government Bill for the possible transfer or purchase of the London Water Companies' undertakings, a correspondent writes to "The Times" to insist upon the point that the only fair basis for purchase is to be found in the Companies' net income; and he cites as precedents for this arrangement the cases of the great provincial towns which have acquired possession of their water supply. The essential objection to "market quotations" as a basis of purchase in this instance doubtless lies in the fact that for London water stocks no real "market," in the generally accepted meaning of the word, usually exists. The amounts of the water stocks being comparatively small, and the dealers in them being few, supply and demand, as reflected by quotations, do not come into free play; and the figures printed in the Official List against the stocks of the London Water Companies do not, the writer points out, actually represent market value to anything like the extent to which the figures printed against British railway stocks, for example, represent market value. Despite the confiscatory attitude assumed by the London County Council, there has, as a rule, for many years past, existed among investors a substantial preponderance of would-be purchasers over sellers; and it is legitimately argued that had not intending purchasers been so frequently turned away from water investments by the stereotyped answer that there was "no stock offering," and had not the supporting force of their money consequently gone to raise instead the quotations for other first-class securities which were much more freely dealt in, the quotations for water stocks would probably have stood higher than they do at present.

The Management of the Wigan Corporation Gas-Works.—Mr. J. Timmins, Assoc.M.Inst.C.E., has had the management of the Wigan Corporation Gas-Works for the past nine years, during which period he has carried out considerable extensions, the cost of which (including both manufacturing and distributing plant) has totalled up to about £61,000. In the eight years ending March 31, 1895, the gross profits of the Gas Department were £162,454, as compared with £120,389 for the preceding eight years; showing an increase of £42,065, though during the latter period meter-rents were abolished. At the time of his appointment, there were on the register 5298 consumers; whereas in March last there were 7709—a rise of 2411, or an increase to the extent of 31·27 per cent. The consumption of gas at the respective periods was 213,731,000 and 295,590,000 cubic feet—a rise of 81,859,000 cubic feet, or 38·30 per cent. These interesting facts were presented to the Salaries Committee of the Corporation a short time ago; and the majority of the Committee came to the conclusion to recommend the Council to show their appreciation of the good work done by their Gas Engineer by increasing his salary £100 per annum. This recommendation came before the Council last Wednesday; but they declined to adopt it. Of course, nobody denied the ability of Mr. Timmins, or ventured to ignore or depreciate his work. But it was urged that the time was not "opportune" for increasing salaries; and the Corporation were paying as much as they could afford. Moreover, they had given him an assistant in the person of his son, at a salary equivalent to the proposed advance. Then the Trades Council weighed in a protest against the increase, on the ground that the town was already "too heavily burdened with taxation." Mr. J. T. Gee spoke up on behalf of Mr. Timmins, to whom, he said, the real credit was due for the present position of the undertaking; but it was of no use. The recommendation was rejected by 19 votes to 8.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Mr. Isaac Carr, of Widnes, should be careful of his facts before he puts them into a Presidential Address. He told the Manchester District Institution of Gas Engineers (as reported in the last number of the "JOURNAL") that: "In the gas world of the British Isles, there has been a dearth of invention or improvement for some time past, so much so, that our leading engineers have been fain to take lessons from our American brethren in matters of gas enrichment." This is not very flattering to "our leading engineers," whoever, in Mr. Carr's estimation, they may be. Let me refresh his memory a little. I am not aware that the stoking machines which have been brought out by Mr. Foulis, of Glasgow, and by Mr. West, of Manchester, were in any degree the product of inspiration derived from abroad. Along with this, there has been much ingenious machinery produced for the handling and conveying of coal, by various inventors. Then there have been considerable improvements by British inventors—and notably Mr. G. R. Hislop, of Paisley—upon the method or carbonizing coal by regenerative firing. I think, too, the penny-in-the-slot meter, one of the most popular inventions of recent years, cannot be attributed to anyone other than an Englishman. It is true that the greatest recent discovery in connection with the burning of gas—the incandescent burner—was the invention of a Continental gentleman; but there have been many improvements in gas-burners besides the incandescent. I would at once, of course, mention the great inventions of Mr. George Bray, of Leeds, except for the fact that Mr. Carr's remark was confined to the period expressed as "some time past." The columnless gasholder, too, was the invention of, I believe it has resulted, more than one person; but whoever, or how many, they were, the inception and carrying out of the idea was entirely English. The Dinsmore process I need not cite, because it was apparently, in Mr. Carr's estimation, about the solitary bright spot in the great darkness of recent years. I say nothing of the results of working this system, as I have not gone into the figures on the subject; neither do I grudge Mr. Carr whatever advantages he may derive from the use of it. On the contrary, let the cheapest and best process prevail. It would be foolish of any engineer, or publication either, to take up any other attitude, because, if they did, the march of events would soon leave them in solitude. But my reason for writing this particular note, I have still to state. Mr. Carr was speaking of the enrichment of coal gas, which is a subject I have taken a good deal of interest in "for some time past;" and as, to my mind, the greatest of all enrichment processes—the Peebles—is not yet four years old, and the inventor is a Scotchman, I consider I have good ground for pointing out Mr. Carr's error. This ground is made still firmer, when Mr. Carr proceeds to say that engineers in this country have been taking lessons from their American brethren in matters of gas enrichment. My reading of the situation is that it is the other way—that some, at least, of our American brethren have been taking lessons here. This statement, I do not expect to be accepted; but as it is desirable that honour should be given to whom honour is due, I consider it my duty, while not depreciating foreign engineers, to see that no prejudice is done to the abilities of home inventors. Had Mr. Carr not done the latter, I would not have taken notice of his remarks. I am sure he will see the awkward position in which he has placed himself.

I learn that the contract has this week been completed for the introduction of the Peebles oil-gas plant into the Paisley Gas-Works. The installation is to be a large one; but the size of it will depend upon circumstances, and I cannot give any explanation either as to size or cost. In about three months, probably, the plant will be in operation. I have also heard of negotiations for the introduction of the process into a still larger works than Paisley; but I have no definite information on the subject. Possibly the Oil-Gas Enrichment Company will be content to wait the results of working in Paisley before seeking to obtain experience in another large works. This, however, is only surmise, and has not been communicated to me in any way.

Mr. Forbes Waddell, the Manager of the Forfar Gas-Works, has been asked by the Directors of the Alyth Gas Company to prepare drawings and specifications for a small bench of retorts on a regenerative system, which they propose to erect.

At the annual meeting of the Bridge of Allan Gas Company, which was held on Tuesday, a dividend at the rate of 6s. per share was declared; and it was agreed to reduce the price of gas from 3s. 10d. to 3s. 8d. per 1000 cubic feet. After the meeting, the Directors of the Company and the Police Commissioners of the burgh dined together, on the invitation of the former.

The Dumfries Gas Commissioners have received a report from the Manager (Mr. G. Malam) on the result of tests which he had been making in the manufacture of gas; and a Sub-Committee has been appointed to inquire at other gas-works what their experience has been in the manufacture of gas from oil, and to otherwise investigate into the production of gas from coal and from coal and oil. It is not stated what is the occasion for this inquiry; but it is to be inferred that Mr. Malam is meeting with some difficulty in the working of his plant. Appointing a Committee to ascertain how other managers succeed is, however, rather a sorry way to keep a manager right. To put it the other way, what would be the good—or rather, does not everyone see how undesirable it would be—for managers in other places to give a Committee information which they might use against their own manager. It is a different affair one manager telling another, which they do at association meetings, and like gatherings; but Mr. Malam has ceased to take advantage of such opportunities, his resignation of membership in the North British Association of Gas Managers having been announced last year. The appointment of this Committee should make him re-consider his resignation.

The electric lighting installation which has been fitted up in Ayr, to plans by Mr. Robert Hammond, has not as yet proved a success. A fault has developed in one of the lengths of cable, and burned the cable out at the spot; the result having been that an art exhibition was in darkness for three nights, and the street-lamps have been out. It is also found that seven transformers are about one-third below the specified capacity. The Town Council met on Monday night, to consider what should be done; and the electric lighting in the Council Chamber was so poor that the members could not read the documents on the subject which were placed before them. The gas lights had accordingly to be put into use. One member described the proceedings in connection with the fitting up of the installation as "just one bungle after another." It was agreed to purchase from other manufacturers seven transformers, to replace those found defective—a proceeding which, it was admitted, might land the Corporation in litigation.

In Dundee, also, the electric lighting installation is giving trouble. There are only four lamps in the streets; and on Friday night of last week one of them went out, while the other three gave a very unsatisfactory light. Again, on Sunday last, all four lamps went out shortly after seven o'clock; and it was necessary to light the gas-lamps.

As bearing upon the much-debated question of the difference in cost between lighting by gas and by electricity, a notable instance has come under my notice this week. In a large establishment in Edinburgh, where the charge for gas consumed in the three months ending in January used to be about £30, the cost of electricity for lighting the place for the corresponding period of this winter amounted to over £90; and that, too, in spite of the fact that the firm are in a position to use four arc lamps, which give light much cheaper than incandescent lamps. The proprietors got something like a fright when their account came in; and strict orders have been given to economize in the use of the current. This means that less light is to be got to work by; but, indeed, they have that already, for in one apartment where there used to be seven gas-lamps—giving, roughly, not less than the light of 18 candles each—there are now seven incandescent electric lamps, nominally of 16-candle power each, which would give an aggregate light equal to 114 candles. These are, however, now capable of giving only about 13 candles each—an aggregate of 91 candles.

The gas-rental collected in Dundee for the ten months of the financial year which have elapsed, has amounted to £57,221, which is an increase of £2892 over the amount in the corresponding period of last year. For electric current in the same period, the rental collected has amounted to £3104—an increase of £745. The gas-lamps in the streets, of which there are about 4800, burnt gas during February to the value of £515 18s.; while four arc lamps consumed electricity to the amount of £15 17s. 11d. That is to say, the gas-lamps cost about 2s. 3½d. each; while every arc lamp consumed £3 19s. 6d. worth of electric current. Thus each arc lamp cost twenty times as much as a gas-lamp. How is the cost per candle power? Taking an arc lamp of, nominally, 1000 candles—but really giving 800 candles—the cost for each was 954d., which works out at a little more than 1d. per candle per month; and taking each gas-lamp as giving 15 candles, at 2s. 3½d. each, the cost per candle per month is a little over 2d. I have heard the remark made that twenty times the amount of light is got from electricity as from gas, for the same cost; but this experience in Dundee puts another complexion on the matter.

A very fortunate and happy ending is now in view in connection with the proceedings for the transfer of the Millport Gas Company's undertaking to the Police Commissioners. A Committee of the Commissioners met with some of the Directors of the Company; and after a full discussion, it was agreed that the transfer should be made upon a valuation by an expert. If the valuation is agreeable to both parties, the costs are to be borne mutually; if one of the parties resiles from the transfer, they are to pay the whole of the costs. The Commissioners having homologated the arrangement, Mr. J. M'Gilchrist, Manager of the Dumbarton Gas-Works, has been appointed Valuator. Mr. M'Gilchrist has accepted the office, and is to proceed with the valuation on an early date. He has acted in the same capacity on several other occasions; and his valuations having given satisfaction, the transfers have been effected at small cost.

The following statement appeared in a Glasgow newspaper on Tuesday last: "A reduction of 2s. 7d. per ton on railway charges for coal from the Silesia district of Germany to the Baltic ports came into force to-day; and its effect on our trade is that Scotch coal will be practically extinguished in the competition for open contracts in Germany. At the same time, it is gratifying to learn that Scotch coal-masters are almost every other week winning back the foreign contracts lost through the last great strike. This is not to be wondered at, as good coal is being offered at Glasgow quayside at under 6s. per ton. In England, the bottom price is 7s. per ton."

The following announcement has just been made: Quite a number of years ago, "boring" operations were carried out to a great extent on Cousland Estate—the Earl of Stair's—closely adjoining Elphinstone. These operations met with a deal of success—among other seams, a very rich and thick "gas coal" being discovered; but nothing further was done at the time. Latterly, Mr. White, the lessee of House o' Muir Estate colliery in East Lothian, has been sounding the Cousland Estate, with a view to coal excavating there; and he has met with so much success that he has already begun to open a shaft in the field known as Cousland Park. The gas coal here is said to be of first-rate quality; but it is much thinner at this point than in several other portions of the estate. In his sinking operations, Mr. White will first pierce the "gas coal;" but it is understood to be a 3½ feet seam of household coal he will in the meantime go in for. It lies some 16½ fathoms from the surface.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March 7.*

Sulphate of Ammonia.—Throughout the week, the market has been quiet but steady; quotations remaining at £8 7s. 6d. to £8 8s. 9d. per ton f.o.b. at the ports. Parcels offering at these prices have been taken up; but buyers decline to pay any advance. The only satisfactory feature has been a greater buying for home consumption; but, unfortunately, this has not been of sufficient bulk to make any appreciable impression on the market, in the absence of large demand for export. There has been a good inquiry from abroad for autumn delivery; and there would no doubt be considerable buying at a moderate premium upon prompt prices, but sellers are shy about

operating in that position; and meantime, having scarcely made up their minds as to price, there is nothing doing so far ahead.

Nitrate of Soda is quieter; but prices remain fairly steady. Spot value is 8s. per cwt. for good, up to 8s. 1½d. for fine quality. Due cargoes are worth about 7s. 11¾d. per cwt.

LONDON, *March 7.*

Tar Products.—Benzols are moderately steady; but efforts are not wanting, however, to depress this article for forward delivery. Carbolic acid continues very firm, with a large business doing. Pitch is undoubtedly weak, due no doubt to buyers holding back in the hope of lower prices, but, to some extent, possibly owing to the low prices of coal. Creosote is in over-production, and the price keeps low; but there is a better tone in the market for naphthalene. Anthracene continues steady, with a fair inquiry for forward contracts.

Prices current during the week are: Tar, 18s. to 22s. 6d. Pitch, 32s. to 34s. Benzols, 90's, nominal, 2s.; 50's, 1s. 7½d. Toluol, 1s. 6d. Solvent naphtha, 1s. 2½d. to 1s. 3½d. Crude, 30 per cent., naphtha, 9½d. Creosote, 1d. Naphthalene, pressed, 45s.; drained, 27s. 6d. Cresylic acid, 1s. 2d.; brown, 10d. Carbolic acid, 60's, 2s. 3d. Anthracene, "A," 11d. to 1s.; "B," 9d. to 10d.

Sulphate of Ammonia has been selling at £8 5s. to £8 10s., less 3½ per cent., according to position and port of shipment. Makers are intensely disappointed with the market, as with the advance of spring and larger consumption, so far there is no improvement. Gas liquor is offered at 6s. to 7s. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—In the coal trade here, the position shows no indication of any increased activity, beyond rather more inquiry for house-fire qualities—in fact, the tone generally is weaker, if anything. Collieries are in many cases still working only four days per week; and even with this restriction of output, supplies are plentiful. For house-fire qualities, there is still an absence of anything like the usual winter's activity; and as the output is more than sufficient to meet requirements, prices are barely maintained at late rates. Common round coals, suitable for iron-making, steam, and general manufacturing purposes, show no improvement; and excessively low figures are taken to secure orders. Quoted rates for round coals remain nominally unchanged at about 10s. to 10s. 6d. per ton at the pit for best Wigan Arley; 8s. to 9s., for Pemberton four-feet and seconds Arley; 7s. to 7s. 6d., for common house coals; and 6s., for ordinary steam and forge coals. Representatives of collieries, however, ease down in their prices to move away surplus lots, with the result that the tone of the market is anything but strong. With regard to engine classes of fuel, common sorts are plentiful, and in some quarters quite a drug. Prices for these range from 2s. 6d. and 3s. up to 3s. 6d. per ton at the pit; but the better descriptions move off fairly well, with prices steady at late rates—4s. 6d. per ton being the average figure, with some special sorts fetching 5s. A moderate inquiry comes forward in the shipping trade; but the actual business put through continues only limited, and the rates that have to be accepted are excessively low. Ordinary steam coal, delivered at Garston Docks, or the High Level, Liverpool, does not average more than 6s. 9d. to 7s. per ton.

Northern Coal Trade.—There has been a slight increase in the demand for steam coals, which has enabled some of the coal pits to make a little fuller working time; but short work is still the rule at most of the collieries. For best Northumberland steam coals, the price for prompt delivery is 7s. 9d. per ton f.o.b., and for delivery over the season, the quotation is 8s. 3d. Second-class coals are about 9d. per ton below these prices; and steam smalls are rather scarce at 3s. 6d. to 3s. 9d. It is probable now that, with an early spring, there may be a better demand for steam coals; but the contracts that have so far been entered into for the season are very limited, though it is believed that considerable quantities of smithy coals have been sold. There is rather a quiet tone in the gas coal trade, as is often the case in March, when the demand for the home gas-works has decreased considerably, and when there are only limited exports. But it may now be expected that every week there will be an enlargement of the shipments. There is no alteration in prices; but the quotations vary with the different collieries—about 6s. 6d. per ton f.o.b. being the general rate for good Durham gas coals. There is no change of moment this week in the manufactured coal trade; but the demand continues steady, and the deliveries on long contracts seem to be well taken out. Locomotive coal is in good demand, and some of the railway companies are taking more than the quantity contracted for; but the price is less than it was before the turn of the year. In the coke trade, there is more activity than in any other branch of fuel, the demand for blast furnaces having considerably increased of late. Indeed, the best blast furnace coke may be said at the present to be scarce, as well as tending higher in price, though coke for shipment is still very abundant. Coke for export is quoted at 14s. 6d. to 15s. per ton f.o.b.; and the average price for local use is about 13s. 6d. per ton at the furnaces, for early delivery, while for forward delivery there is an advance. In gas coke, the alteration is not so noticeable this week. There is, of course, a diminished production; and, as the demand continues steady, there will in all probability be a reduction of the stocks. Prices show no change this week.

Scotch Coal Trade.—Inactivity still prevails in the coal trade in Scotland; the situation, so far as volume of business and prices are concerned, being much the same as last week. It has been resolved by the coal masters to reduce the miners' wages by 6d. per day, beginning with this week. The men, it is expected, will offer no resistance to the reduction, as, though the wage be smaller, it is hoped that more will be doing, and that work will be more regular than it has been for the past year or so. The reduction brings the wages down to what they were in the summer of 1893, at which time the prices

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 506).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590 000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	23½–24½	..	4 5 8
100,000	10	„	7½	Do. 7 p. c.	16½–17½	..	4 5 8
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	108–110	..	4 10 11
200,000	10	16 Oct.	4	Belgrano (B. Ayres), Limited	8–9	+¼	4 8 11
100,000	Stck.	30 Dec.	5	Do. 5 p. c. Deb. Stk	95–100	..	5 0 0
200,000	5	14 Nov.	6½	Bombay, Limited	7½–7¾	..	4 3 10
40,000	5	„	6½	Do. New, £4 paid	5½–5¾	..	4 10 3
380 000	Stck.	27 Feb.	12	Brentford Consolidated	280–285†	+5	4 4 3
210,000	„	„	9	Do. New	215–220*	+2	4 1 9
50,000	„	„	5	Do. 5 p. c. Pref.	—	..	—
159.375	„	16 Dec.	4	Do. 4 p. c. Deb. Stock.	127–132	..	3 0 7
220,000	Stck.	27 Sept.	11	Brighton & Hove Original	230–235	..	4 13 8
208,820	„	„	8	Do. A Ord. Stk.	185–190	..	4 4 3
933,500	Stck.	27 Feb.	5	Bristol, 5 p.c. max.	123–126*	..	3 19 4
420,000	20	27 Sept.	11½	British	55–56	..	4 0 4
50,000	10	29 Aug.	11½	Bromley, Ordinary 10 p. c.	22½–23½	..	4 17 10
71,000	10	„	8½	Do. 7 p. c.	19–20	..	4 5 0
500,000	10	14 Nov.	4	Buenos Ayres (New) Limited	9½–10	..	4 0 0
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	102–104	..	5 15 5
150,000	20	27 Feb.	8½	Cagliari, Limited	29–31*	..	5 6 5
100,000	10	27 Sept.	6	Cape Town & District, Ltd.	12½–13½	..	4 8 10
50,000	50	2 Nov.	6	Do. 6 p. c. 1st Mort.	57–59	+1	5 1 9
550,000	Stck.	16 Oct.	13½	Commercial Old Stock	330–335	+2	4 0 7
165,000	„	„	10½	Do. New do.	257–262	..	4 0 3
165,000	„	16 Dec.	4½	Do. 4½ p. c. Deb. do.	147–152	..	2 19 2
800,000	Stck.	16 Dec.	13	Continental Union, Limited.	278–283	+1	4 11 10
200,000	„	„	10	Do. 7 p. c. Pref.	215–220	..	4 10 11
51,620	Stck.	27 Feb.	14	Croydon Com'cial A 10 p. c.	280–285*	..	4 18 3
157,500	„	„	11	Do. B 7 p. c.	222–226*	..	4 17 4
535,000	Stck.	27 Feb.	5½	Crystal Palace Ord. 5 p.c. Stk	130–135*	..	3 17 9
60,000	„	„	5	Do. 5 p. c. Pref.	—	..	—
486,090	10	30 Jan.	11	European, Limited	26½–27½	..	4 0 0
354,060	10	„	11	Do. £7 10s. paid	17½–18½	..	4 9 3
5,746,590	Stck.	13 Feb.	12¾	Gaslight & Coke, A, Ordinary	303–308	−2	4 2 9
100,000	„	„	4	Do. B, 4 p. c. max.	108–113	+3	3 10 9
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	288–293	..	3 8 3
30 000	„	„	5	Do. F, 5 p. c. Prf.	135–140	..	3 11 5
60,000	„	„	7½	Do. G, 7½ p. c. do.	200–205	..	3 13 2
1,300,000	„	„	7	Do. H, 7 p. c. max.	197–202	..	3 9 3
463,000	„	„	10	Do. J, 10 p. c. Prf.	285–290	..	3 9 0
476,000	„	„	6	Do. K, 6 p. c. Prf.	168–172	..	3 9 8
1,061,150	„	16 Dec.	4	Do. 4 p. c. Deb. Stk.	137–140	..	2 17 2
274,850	„	„	4½	Do. 4½ p. c. do.	148–153	..	2 18 9
908,000	„	„	6	Do. 6 p. c. do.	204–209	..	2 17 5
70,000	10	30 Oct.	6	Hongkong & China, Limited	13–14	..	4 5 8
3,800,000	Stck.	14 Nov.	12	Imperial Continental	250–255	−2	4 14 1
376,400	100	1 Feb.	4	Do. 4 p. c. Debs. Red.	100–103	..	3 17 8
473,600	Stck.	13 Feb.	3½	Do. 3½ p. c. Deb. Stk „	108–110	..	3 3 8

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	16 Dec.	6	Malta & Mediterranean, Ltd.	6–6½	..	4 12 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	115–118	..	4 4 10
250,000	100	„	4½	Do. 4½ p. c. Debs.	109–111	..	4 1 1
541,920	20	14 Nov.	5	Monte Video, Limited	16½–17½	+½	5 14 3
150,000	5	28 Nov.	8	Oriental, Limited	8½–8¾	..	4 11 5
135,000	5	„	8	Do. New, £4 10s. paid	6¾–7¼	..	4 19 4
15,000	5	„	8	Do. do. 1879, £1 paid	1½–2	..	4 0 0
60,000	5	12 Sept.	7	Ottoman, Limited	5–5½	..	6 7 3
166,870	10	14 Feb.	2	Para, Limited	1¼–1½	..	11 8 6
420,000	100	2 Nov.	6	People's Gas } 1st Mtg. Bds.	105–110	..	5 9 1
500,000	100	9 Dec.	6	of Chicago } 2nd Do.	100–105	..	5 14 3
250,000	10	16 Oct.	7	San Paulo, Limited	12–13	+½	5 7 8
500,000	Stck.	13 Feb.	15½	South Metropolitan, A Stock	382–387	..	4 0 1
1,350,000	„	„	12	Do. B do.	309–314	+1	3 16 5
310,000	„	„	13	Do. C do.	325–330	..	3 18 9
800,000	„	16 Jan.	5	Do. 5 p. c. Deb. Stk.	175–178	..	2 16 2
60,000	Stck.	12 Sept.	11½	Tottenham & Edmonton, A	250–255	..	4 10 2
60,000	„	„	8½	Do. B	—	..	—
170,380	10	30 Dec.	10	Tuscan, Limited	13–14	..	7 2 10
149,900	10	2 Jan.	5	Do. 5 p. c. Debs. Red.	100–102	..	4 18 0

WATER COMPANIES.

746,021	Stck.	30 Dec.	10½	Chelsea, Ordinary	312–317	..	3 4 8
150,000	„	„	5	Do. 5 p. c. Pref.	168–173	..	2 17 9
160,000	„	„	4½	Do. 4½ p. c. Pref. Stk., 1875	—	..	—
175,783	„	27 Sept.	4½	Do. 4½ p. c. Deb. Stock	155–160	..	2 16 3
1,719,514	Stck.	16 Oct.	7	East London, Ordinary	253–258	+3	2 14 1
654,740	„	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3
100,000	„	„	3	Do. 3 p. c. Deb. Stk.	105–107	..	2 16 1
700,000	50	16 Dec.	6½	Grand Junction, 10 p.c. max.	125–129	+1	2 10 4
280,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	145–150	..	2 13 4
708,000	Stck.	13 Feb.	12	Kent	332–337	+5	3 11 2
160,000	„	„	7	Do. New, 7 p. c. max.	205–210	..	3 6 8
1,043,800	100	30 Dec.	7½	Lambeth, 10 p. c. max.	270–275	+10	2 12 9
406,200	100	„	7½	Do. 7½ p. c. max.	220–225	+8	3 4 5
330,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	147–152	..	2 12 8
500,000	100	13 Feb.	12¾	New River, New Shares	415–425	+7½	3 0 0
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	152–157	+5	2 10 11
902,300	Stck.	16 Dec.	6	S'thwk & V'xhall, Ordinary	172–177	+4	3 7 10
126,500	100	„	6	Do. Do. 7½ p. c. Max.	155–165	+5	3 12 9
489,200	Stck.	„	5	Do. Do. 5 p. c. Pref.	168–173	..	2 17 9
1,019,585	„	—	4	Do. 4 p. c. A Deb. Stk.	147–152	..	2 12 8
1,155,066	Stck.	16 Dec.	10	West Middlesex	305–310	..	3 4 6
200,000	„	„	4½	Do. 4½ p. c. Deb. Stk.	155–160	..	2 16 3

*Ex div.

obtained for coal were rather higher than at present. There is said to be 800,000 tons of coal lying at pitheads in Scotland; and railway companies and other large coal users have laid in large stocks. All this has a depressing effect on trade. The prices quoted are: Main, 5s. 9d. (easy) per ton f.o.b. Glasgow; ell, 6s. 6d. to 6s. 9d.; splint, 6s. 3d. to 6s. 6d.; and steam, 7s. 6d. The shipments for the week amounted to 117,180 tons—a decrease of 4111 tons upon the quantity in the preceding week, but an increase of 14,262 tons as compared with the corresponding week of last year. For the year to date, the total quantity shipped has amounted to 996,142 tons—an increase over the same period of last year of 126,798 tons.

The Prepayment Meter System at West Bromwich.—At a meeting of the West Bromwich Town Council last Wednesday, the Gas Committee presented a report stating that they had had under consideration for some time past the question of popularizing the use of gas by means of automatic prepayment meters; and they had decided that an experiment should be made to the extent of 500 meters. The Gas Department would provide the meters, service-pipes, fittings, and a griller, as well as the necessary internal piping, without charge; and the price of gas to consumers so supplied would be 1d. for every 25 cubic feet. The Committee thought that arrangements should be made, if possible, with those firms of gas-fitters at present residing in the borough, to enable them to undertake the work of fitting up houses (beyond the meter) at a fixed charge per house, or at a schedule of prices. The report was unanimously approved.

Reduction of Gas-Meter Rents and Charges at Haslingden.—The Directors of the Haslingden Union Gas Company have recently resolved to reduce the meter-rents by 50 per cent., and the price of gas by about 5 per cent. Consumers of under 100,000 feet of gas will be charged at the rate of 3s. 4d., less 2½ per cent. discount, if paid within the regulation time; consumers of under 300,000 feet, 3s. 4d., less 5 per cent.; consumers of 300,000 feet and upwards, 3s. 2d., less 5 per cent.

Gas Exhibition at Stockton-on-Tees.—On Monday of last week, the Mayor of Stockton (Alderman T. Watson) opened an exhibition of gas appliances in the Borough Hall. Addressing those present, his Worship stated that it was eleven years since gas-stoves and similar appliances were introduced by the Corporation. The innovation had been so successful that they now had 2750 out in the town; and they hoped during the present year to increase the number to 3000. The exhibitors were Messrs. Charles Wilson and Sons and Messrs. George Bray and Co., of Leeds; Miss G. Knott giving cookery lectures.

The Colonial Lighting Syndicate, Limited.—There was registered in Edinburgh last week a joint-stock undertaking bearing the name of the Colonial Lighting Syndicate, Limited, the object of which is to "purchase, lease, or otherwise acquire in Australia, New Zealand, Tasmania, or in any colony or dependency of Great Britain, either as undeveloped properties or as going concerns or otherwise, lands and gas-works and gas undertakings, and to work, carry on, develop, sell, lease, mortgage, or otherwise dispose of the same." The capital is £2000 divided into 40 shares of £50 each. Among the first subscribers are Mr. W. Cowan, Mr. W. Henry Cowan, Miss E. L. Cowan, and Mr. J. Hepworth, M.Inst.C.E.

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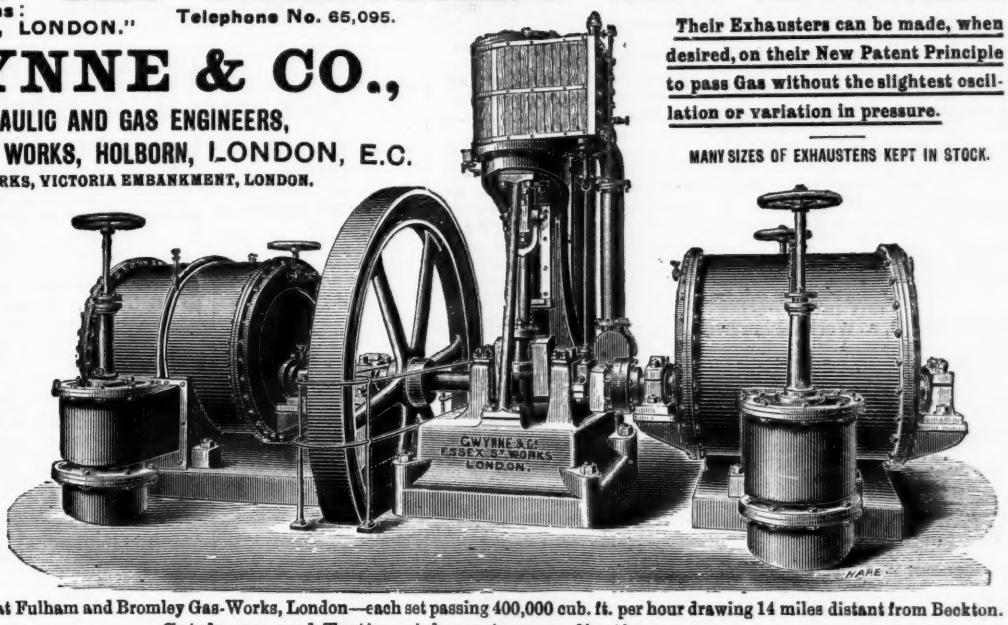

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Catalogues and Testimonials sent on application.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

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*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Purity London." Telegrams: "Holmes Huddersfield."

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Telegrams: "HUTCHINSON BROS., BARNSLEY."

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BROTHERTON AND Co., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND Co., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

In Paper Covers, Post Free 2s.

STEPHEN CARPENTER, of the Bow
Common Gas-Works, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a description of Carpenter's short Method of working off the Sulphur Test and Table for calculating Results.
S. & H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY & SON, Phœnix Iron-Works, LEWES.

COLLECTORSHIP, or Position of Trust,
Wanted by Gentleman of good address, and well qualified. Age 42. Highest References.
Address H. P., 46, Westbourne Villas, WEST BRIGHTON.

WANTED, a Situation as Working MANAGER. Twenty Years in present Situation as Fitter. Has had thorough experience in General Routine of a Gas-Works.
Address, G. LUXON, 10, Burrow Road, ILFRACOMBE.

CORPORATION OF COLNE.
(GAS DEPARTMENT.)

WANTED, a Works Foreman. Salary £2 5s. per Week.
Statement of Duties can be obtained from the Engineer, to whom applications must be sent on or before Wednesday, March 18, 1896, accompanied by *copies* of three recent Testimonials.
State whether Married or Single, also Age and Experience.
HY. SIMMONDS, C.E.,
Engineer and Manager.
Gas-Works Offices, Colne, Lancashire.

WANTED, a good, Sound Second-Hand PURIFIER, 8 ft. by 10 ft. or 12 ft.
Price and Particulars to G. H. GISBY, Esq., Secretary, Gas Company, Ware, HERTS.

WANTED, by the Abertillery District Council, two second-hand PURIFIERS, about 12 ft. by 8 ft. by 4 ft. 6 in. internal measurements, and 8-inch Inlet and Outlet. Must be in good condition.
Give full Details and Price delivered on Rail, to the MANAGER, Gas-Works, Abertillery, MON.

OFFERS Wanted for the Tar and LIQUOR made by the Chigwell, Loughton, and Woodford Gas Company, at Woodford, Essex.
All Particulars can be had from the Manager.
Tenders to be addressed to the SECRETARY, on or before the 14th of March, 1896.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS,
Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel.
Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED,
MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow, and Newcastle-on-Tyne. Telegrams: "Subastral, London."

GAS PLANT, BUILDINGS,
AND
FREEHOLD LAND AT CARSHALTON, SURREY,
FOR IMMEDIATE SALE.

THE Croydon Commercial Gas and Coke Company, having discontinued the Manufacture of Gas at their Works in Wrythe Lane, Carshalton, Surrey, have the following GAS PLANT, APPARATUS, BUILDINGS, and FREEHOLD LAND FOR SALE, viz.—
Retort-House and Coal-Store complete, with Wrought-Iron Roofs, six Beds of six Round Fire-Clay Retorts in each, 18 inches diameter by 9 ft. 3 in. long, and three Beds of similar new Retorts and Arches, and three Arches, complete, ready for Retorts.
Hydraulic Mains, Fittings, &c.
Horizontal Steam-Engine, Exhauster, and Exhauster Governor, complete.
Washer (Good's Patent), 8 feet diameter, with 12-inch Connections and Valves complete.
Washer, 12-inch, with 6-inch Connections and Valves complete.
Four Purifiers, 12 feet square, with Sieves and 12-inch Connections, Lifting Apparatus and Railway for same, complete.
Station Meter, 10,000 cubic feet per hour, with 12-inch Connections.
Gasholder (Single-Lift), 80 feet by 24 feet, with Brick Tank, Columns, Inlet and Outlet Valves complete, prepared for Telescoping.
Gasholder (Single-Lift), 60 feet by 16 feet, Standards, Brick Tank, &c.
Gasholder, 35 feet by 12 feet, Standards, Brick Tank, &c.
Governor, 12 inches diameter, with 12-inch Valves and Bye-Pass complete.
Evans Photometer, Clock, Gauges, &c., complete.
House and Offices, Engine and Boiler House, Meter-House, Lobby and Store-Room, Governor-House and Testing-Room, Purifying House and Shed, Smith's Shop.
Freehold Land, 3 acres, 0 roods, 37 perches (about 2 acres not built upon).
Orders to view the Plant and Works, and Particulars of Prices the Company require for the whole or any portion of the above, can be obtained on application to
W. J. RUSSELL,
Secretary.
Offices: Katharine Street, Croydon, March, 1896.

REPORTS OF GAS ASSOCIATIONS.

A FEW complete Sets of the Reports OF GAS ASSOCIATIONS from 1883 to 1894, twelve Volumes) may be obtained of the PUBLISHER of he "JOURNAL," *Price 30s., cash with order.* The Volume or 1895 (or single copies of previous Volumes) 5s. *6d. post free.*

PORTER & CO., Gowts Bridge Works,
LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and adroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH,
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

TO EMPLOYERS, COMPANY DIRECTORS, ETC.

THE LAW GUARANTEE & TRUST SOCIETY, LD., GUARANTEES FIDELITY.

SEND for complete Prospectus containing Balance-Sheet, Copy of Policy, &c., &c. Mortgage, Debenture, License, and Contingency Insurance.
Head Office: 49, CHANCERY LANE, LONDON, W.C.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

FOR SALE—A Second-hand 200-Light WET METER (Cowan's). In good order.
Address the SECRETARY, Gaslight Company, FELIXSTOWE.

FOR SALE, Cheap—One 6-inch Four- WAY and one 6-inch THREE-WAY COCKEY'S DRY-FACED VALVES, in perfect order.
Apply to J. J. LYNE, Gas-Works, Enniscorthy, WEXFORD.

GAS PLANT FOR IMMEDIATE SALE.

THE Willenhall Gas Company, having discontinued the Manufacture of Gas at their Works in Lower Lichfield Street, Willenhall, Staffordshire, have the following GAS PLANT for Sale, viz.—
TELESCOPIC GASHOLDER. Outer Lift, 45 ft. by 18 ft.; Inner Lift, 43 ft. by 18 ft. Cast-Iron Columns. Capacity, 53,390 Cubic Feet.
Two TELESCOPIC GASHOLDERS. Outer Lift, 60 ft. by 18 ft.; Inner Lift, 58 ft. by 18 ft. Cast-Iron Columns. Capacity of each, 94,425 Cubic Feet.
STATION METER, to pass 15,000 Cubic Feet per hour; 10-inch Connections. Hydraulic Valves by J. & J. Braddock.
WASHER (Kirkham, Hulett, and Chandler), to pass 250,000 Cubic Feet per day; 8-inch Connections.
ANNULAR CONDENSERS (Walker), to pass 250,000 Cubic Feet per day; 12-inch Connections.
GOVERNOR, 12 inches diameter, with 12-inch Connections, and Bye-Pass, by J. & J. Braddock.
Five Ton WEIGHBRIDGE; two EXHAUSTERS (by Jones), to pass 8000 Cubic Feet per hour; 15 by 16 inch MOUTHPIECES (Morton's Patent); ASCENSION-PIPES, &c.
For further Particulars, apply to J. C. Belton Manager.
A. MARSTON,
Secretary.
Gas Offices, Willenhall.

Now Ready, Handsome Cloth, 9s. Post free,

GAS MANUFACTURE
(THE CHEMISTRY OF);

A HANDBOOK ON THE PRODUCTION, PURIFICATION, AND TESTING OF ILLUMINATING GAS, AND THE ASSAY OF THE BYE-PRODUCTS OF GAS MANUFACTURE.

For the Use of Students.

BY W. J. ATKINSON BUTTERFIELD, M.A., F.C.S.,

Head Chemist, Gas-Works, Beckton, London, E.

WITH NUMEROUS ILLUSTRATIONS.

*** This work deals with the MOST MODERN DEVELOPMENTS of the subject; and the chapter treating of the BYE-PRODUCTS will be found of special interest.

London: CHARLES GRIFFIN & Co., Ltd., Exeter Street, Strand.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,
GLASGOW.

[See Illustrated Advertisement, March 3, p. 441.]

The SUBSCRIPTION LIST OPENED YESTERDAY (MONDAY), the 9th day of March, and will close on or before THURSDAY, the 12th day of March, at Four p.m. for TOWN and COUNTRY.

The Working Capital having been guaranteed, the Directors will proceed to allotment upon the List being Closed.

"HOLOPHANE," Limited.

(Incorporated under the Companies Acts, 1862 to 1890.)

CAPITAL - - - - - £100,000,

DIVIDED INTO 100,000 SHARES OF £1 EACH.

ISSUE of 65,000 SHARES of £1 each; payable 2s. 6d. on Application, 7s. 6d. on Allotment, and the Balance by two Instalments of 5s. each, at two and four Months after Allotment—leaving 10,000 Shares for Issue as further Working Capital.

Directors:

HENRY J. DAVIS, Esq., Director Davis Gas-Stove Company, Limited, London.

JOHN HAYNES, Esq., Manager Liverpool Gas-Fittings Company, Limited, Liverpool.

WILLIAM FRANCIS LEESE, Esq., 23, Colville Road Mansions, W., Director of the House-to-House Electricity Supply, Limited, and the Electricity Supply Company of Spain, Limited.

THE O'CLERY, 2, Essex Court, Temple, London, E.C.

Colonel C. F. SMITH, Director of the Grand Hotel Company of Manchester, Limited.

Bankers:

THE CITY BANK, Limited, Threadneedle Street, London, E.C., Shaftesbury Avenue, and all other Branches.

PARR'S BANKING COMPANY and the ALLIANCE BANK, Limited, Liverpool, and all other Branches.

Solicitors:

Messrs. DIXON, WATTS, and ELKIN, Savoy Mansions, London, W.C.

Auditors:

Messrs. FRANK DAVIES, MEREDITH, and CO., Chartered Accountants, London and Birmingham.

Secretary and Offices *(pro tem.)*:

S. M. SCOTT, 35, Queen Victoria Street, London, E.C.

ABRIDGED PROSPECTUS.

THIS Company has been formed for the purpose of acquiring and working, or selling, the Patent Rights for Great Britain and Ireland, Belgium, Germany, and Austria-Hungary, and the Rights for the Colonies and all other countries (except France and the United States), of Messrs. Blondel and Psaroudaki, the Inventors and Patentees of the "Holophane" (from the Greek—Wholly-Luminous) Globe. M. Blondel is the well-known French Expert and Engineer of the French Light-house Service.

The advantages of the "Holophane" Globe are—

It is a Globe designed on strictly scientific principles, grooved vertically inside in order to diffuse the light, and grooved horizontally outside in order to distribute the light.

It is made of the clearest transparent crystal glass, resembling the finest cut glass in appearance, and is produced at an exceedingly low cost.

It throws the light in any and every direction required, and gives perfect diffusion with increased light.

It is applicable to all systems of lighting, and softens glare while increasing illumination.

It shows an uniformly brilliant surface, mellowing harsh centres of light, and destroying sharp shadows.

Since the introduction of gas for lighting purposes, and more particularly since the electric light came into use, great strides have been made in increasing the intensity of the light centres, as in the arc and incandescent electric, and more recently the incandescent gas, giving in each case a vastly increased amount of light, but accompanied by an extremely unpleasant and injurious effect on the eye. In the endeavour to overcome this serious defect, globes and shades of all shapes, sizes, and colours have been devised and used, with the result, however, that, when partial diffusion was effected, the additional light obtained from the increased brilliancy of the medium was practically absorbed by the globe, and, when the globe was sufficiently clear to transmit a reasonable percentage of the light, the actual centre of illumination remained almost equally visible and obnoxious. It has been reserved for the "Holophane" to perfectly satisfy the demand for the utilization of the whole of the light supplied, with complete diffusion and distribution, coupled with an elegancy and beauty of appearance not hitherto approached.

The "Holophane" Globes are made in shapes, sizes, and colours found, by a series of experiments, to be the most suitable for the various systems of lighting, and, being produced by a purely mechanical process, can be put on the market at prices defying competition, and yet yielding very large profits.

In order to give some idea of the profits which may be made, the "Gas Engineer's Annual," 1895, gives the total number of customers of the various Companies and Corporations in the United Kingdom as 2,653,603, from which we get the following estimate:—

Averaging the number of burners per customer at ten each.	=26,536,030
Say that one-half are fitted with globes of some kind . .	=13,268,015
Grant each globe an average life of five years, the yearly requirement of globes	= 2,653,603
Assuming that the "Holophane" Company take only one-quarter of that number (say).	663,400
The estimated minimum net profit of 1s. each globe, gives an annual profit from gas-globes alone of	£33,170
A sufficient amount to pay a dividend on the capital of the Company, per annum, of over.	33 per cent.

Again, take for example the actual figures published by the Incandescent Gas-Light Company, Limited, from which it will be seen that any valuable improvement in connection with lighting meets with immediate and rapidly-increasing success.

The burners sold in the nine months ending the 1st of January, 1895, amounted to	220,000
And the burners now in use in Great Britain alone amount to over	1,350,000
While the net profits for the year ending the 31st of March, 1895, were	£75,000

The above calculation of the estimated sales of the "Holophane" Globe applies solely to gas (and then only in the United Kingdom), and no account has been taken of the demand which must immediately arise in connection with all systems of electric lighting, and for oil-lamps of all kinds, to which the "Holophane" is equally adapted. From this source an equally large profit may fairly be expected.

Assuming that the remaining Foreign Patents and Rights are disposed of upon terms similar to the American, the profit arising therefrom would be—

Germany (with sole rights to trade in Russia and Switzerland)	£6000 and 25 per cent. of the Profits.
Austria-Hungary (with sole rights to trade in Italy, Greece, Servia, Bulgaria, Roumania, and Turkey)	£6000 and 25 per cent. of the Profits.
Belgium (with sole rights to trade in Holland, Denmark, Sweden, and Norway) . . .	£6000 and 25 per cent. of the Profits.

It is proposed that the parent Company should deal directly with the Colonies, Spain, Portugal, Japan, China, South America, and all other countries not included in the above.

In connection with the United States Patent, the purchaser, Mr. George A. Macbeth, the largest and best-known glass manufacturer in America, cables Feb. 3, 1896: "It is perfectly apparent that this system of managing rays of light will create a complete revolution both in domestic lighting as well as for the illumination of large interiors and public thoroughfares."

Orders are being received in advance, and will be executed in rotation. The Liverpool Gas-Fittings Company, Limited, have contracted for an initial order of 100,000 globes of various classes, and take the Agency for Lancashire.

Messrs. Maple and Co., Limited, have authorized the insertion of the following: "An installation of the 'Holophane' with the electric light has been established in the electro-plate department of Maple and Co., Limited, Tottenham Court Road, London, which gives complete satisfaction, and may be viewed at any time by persons interested."

It is almost impossible to adequately explain without illustration the immense stride the invention makes in the nature of globes or "light coverings." Suffice it to say that the experimental stage has been passed, and a perfected globe is placed before the public.

Professor Vivian B. Lewes, of the Royal Naval College, Greenwich, and Chief Gas Examiner to the Corporation of the City of London, has made a series of tests and experiments, and has reported as follows:—

"Having carefully tested the 'Holophane' Globes, I find that, when used with intense and local lights, such as incandescent gas and electric lights, they give an increase of illumination over that yielded by the bare light itself, from the horizontal plane down to angles, of 45 per cent.

"This increase amounts in the case of the tulip-shaped globe to 12·3 per cent., and with the cone-shaped globe to 13·1 per cent. I have made similar tests with ordinary globes, such as those of opal, ground, frosted, and fancy glass, and find that under the same conditions they show average losses of illumination as compared with the bare light itself ranging from 11 to 51 per cent.

"Great as this advantage undoubtedly is, I consider a still more important point is the spreading of the light over the whole surface of the globe, by which an intense point of light, which is highly injurious to the visual organs, becomes converted into a pleasant and highly-effective illumination, the actual source of light being undistinguishable to the eye."

Thus a 50-candle power Welsbach light, covered with a "Holophane" Globe, gives in all directions, from the horizontal to the foot of the light, an average increase of from 12 per cent. more light than the bare light itself to 150 per cent. more than a ground opal glass globe.

The opinion of Mr. J. Fletcher Moulton, Q.C., has been obtained to the effect that the claims in the British Patent are valid.

For Contracts, &c., see full Prospectuses, which, with Forms of Application, may be obtained from the Bankers, Solicitors, Auditors, and at the Offices of the Company.

FORM OF APPLICATION FOR ORDINARY SHARES.

This form should be filled up and forwarded entire, with Cheque or Postal Order for the deposit of 2s. 6d. per share, to the Company's Bankers or any of their branches, or direct to the Secretary, at 35, Queen Victoria Street, London, E.C.:—

"HOLOPHANE, Limited."

To the Directors of "Holophane" (Limited).

GENTLEMEN,—Having paid to your Bankers the sum of £ , being the amount of deposit of 2s. 6d. per share on application for Ordinary Shares of £1 each in "Holophane," Limited, I request you to allot me that number of Shares; and I agree to accept the same, subject to the provisions of the Memorandum and Articles of Association, and upon the Terms and Conditions of the Prospectus of the Company; and I authorize you to place my name upon the Register of Members in respect of the Shares to be so allotted.

Signature .....
Name (in full) .....
Residence .....
Profession or occupation .....
Date 1896

ON SALE, for immediate removal—
One GASHOLDER, 40 feet diameter, 14 feet deep, with Columns and Girders complete.
One GASHOLDER, 30½ feet diameter, 11 feet deep with Columns and Girders complete.
Also a quantity of RETORT-FITTINGS, including MOUTHPIECES, LIDS, ASCENSION-PIPES, H-PIPES, and HYDRAULIC MAINS.
For further Particulars, apply to G. E. Saville, Engineer, Gas-Works, Todmorden.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of GAS COAL.
Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.
Tenders to be sent in not later than Twelve o'clock noon, the 12th of March, 1896, addressed to Councillor F. Geen, Chairman, Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

Wm. Prince,
Engineer and Manager.

Gas-Works, Stoke-upon-Trent.

CAST-IRON GAS-MAINS.

TENDERS are invited by the Urban District Council of Abergavenny for about 50 Tons of 3, 4, 5, and 6 inch Cast-Iron Socket and Spigot PIPES and SPECIALS.
For Particulars, apply to Mr. S. Cross, Gas-Works, Abergavenny.
Tenders, sealed and endorsed "Tender for Gas-Mains," to be delivered to the undersigned not later than Noon on Friday, March 20, 1896.
The lowest or any tender not necessarily accepted.

J. T. Rutherford,
Clerk to the said Urban District Council.

Town Hall, Abergavenny,
March 6, 1896.

MILLOM URBAN DISTRICT COUNCIL.
(Gas Department.

THE Gas Committee invite Tenders for the EXTENSION of RETORT-HOUSE and RETORTS; also TENDERS for EXHAUSTER, STATION METER, GOVERNOR, MAINS, &c., at the Millom Gas-Works.
Plans and Specifications may be seen at my Office on and after the 28th of February inst
Sealed tenders, endorsed "Extensions to Retort-House, &c.," or "Tender for Exhauster, &c.," must be sent in to me on or before the 14th of March prox.
The Council will not be bound to accept the lowest or any tender.

W. T. Lawrence,
Clerk to the Council.

Millom, Cumberland,
Feb. 24, 1896.

PERTH CORPORATION.

TENDERS FOR GASHOLDER.

THE Perth Gas Commissioners invite TENDERS for the supply and erection of a TELESCOPIC GASHOLDER, with Cast-Iron Tank, 125 feet in diameter.
Copies of Plans and Specification may be had on application to the Commissioners' Engineer, Mr. Andrew Wilson.
Offers to be lodged with William MacLeish, Esq., Clerk to the Commissioners, City Chambers, Perth, not later than Saturday, the 14th of March.
The Commissioners do not bind themselves to accept the lowest or any offer.
Gas-Works, Perth,
Feb. 25, 1896.

URBAN DISTRICT COUNCIL OF DUKINFIELD.

TENDERS FOR GAS COAL.

THE Gas Committee require Tenders for Seven Thousand Five Hundred Tons of GAS COAL, to be delivered by Road, Rail, or Canal, commencing on the 1st of May next, and concluding the 30th of June, 1897. Of this quantity, 3500 Tons will be received before the 15th of August next for Stock. None but fresh-got screened best quality GAS COAL free from fault need be offered; and no Testimonials or Analyses are required.
No Tender will be considered which may be received after Twelve at noon on Wednesday, the 25th of March.
Sealed envelopes, endorsed "Coal," to be directed to the Chairman of the Committee, Mr. Councillor Halstead, Gas Offices, Charles Street, Dukinfield.
Tender Forms and further Particulars on application to

Harrison Veevers, C.E.,
Engineer and Secretary.

Dukinfield, Feb. 27, 1896.

KNUTSFORD LIGHT AND WATER COMPANY.

THE Directors invite Tenders and full Particulars and Prices for OBTAINING and LIFTING from 250,000 to 350,000 gallons of WATER per day of 24 hours. These new Works are to be placed at Booth Mills, one mile from Knutsford Station; and the Works must include all Appliances for lifting the Water to the level of the ground, and, if necessary, to a Tank 140 feet above the level of the ground at Booth Mills, through an 8-inch Main, three-quarters of a mile long. The Price must include for Boring and obtaining Water underground.
A full description of the Works and the Linings of the Borehole, with Prices and the extent of time required for the execution of the Works, to be sent to the Chairman of the Company, W. Nicholls, Esq., King Street, Knutsford.
For further Information, apply to the Secretary of the Company.
Tenders to be sent in not later than the 24th inst.
The Directors do not bind themselves to accept the lowest or any tender.

MACCLESFIELD CORPORATION.
(Gas Department.)

TO MAINLAYERS.

TENDERS are invited for the Labour required in the LAYING of 1000 yards of 12-inch MAINS.
Particulars on application to

J. G. Newbigging,
Engineer.

RAMSGATE CORPORATION.
(Water Department.)

TWO New Steel Boilers, 30 ft. by 7 ft. 6 in. are required, to be delivered by the end of August.
Specification and full Particulars will be furnished on application, accompanied by a deposit of Two Guineas (£2 2s.), which will be returned on receipt of a *bonâ-fide* tender.
Tenders must be sent in on or before Monday, March 23.

William A. M'Intosh Valon,
Engineer.

ISLE OF THANET GAS COMPANY, MARGATE.

THE Directors of the above Company are prepared to receive TENDERS for the supply of PETROLEUM SPIRIT for the Twelve Months commencing the 1st of April, 1896.
For all Particulars as to the Quantity required, &c., apply to the Engineer and Manager, Mr. H. H. Jones.
Tenders will be returnable on or before Thursday, the 19th of March, and to be addressed to the Chairman of the Company.
The Directors do not bind themselves to accept the lowest or any tender.

By order,
Thos. C. Fuller,
Secretary.

Gas-Works, Margate,
March 7, 1896.

COUNTY BOROUGH OF SALFORD.
(Gas Department.)

TENDERS FOR SULPHURIC ACID.

THE Gas Committee invite Tenders for the supply of about 1800 Tons of SULPHURIC ACID.
Forms of Tender may be had on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed tenders, endorsed "Tender for Acid," and addressed to the Chairman of the Gas Committee, to be delivered at the Town Clerk's Office, Town Hall, Salford, not later than Three p.m. on Thursday, March 19, 1896.

By order,
Saml. Brown,
Town Clerk.

Town Hall, Salford,
March 7, 1896.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR, for One Year from Lady-day next.
Delivery on Company's Works filled into Purchaser's Tanks.
Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Wednesday, the 25th day of March next; but the Directors do not bind themselves to accept the highest or any tender.

By order,
W. A. Papfield,
Engineer and Secretary.

Gas Offices: 248, High Street, Exeter,
March 2, 1896.

URBAN DISTRICT COUNCIL OF SMETHWICK.

METERS.

THE Gas Committee invite Tenders for the supply of their requirements, during the Twelve Months commencing the 1st of April next, of WET METERS in Cast-Iron Cases and PREPAYMENT METERS, Wet or Dry.
Also for REPAIRING WET METERS and RE-CASING same in Cast Iron, and for CONVERTING old 3-light Tin WET METERS into PREPAYMENT with new Cast-Iron Cases.
Tenders, endorsed "Meters," addressed to the Chairman of the Gas Committee, to be delivered to the undersigned not later than the 28th inst.
The Committee will not pledge themselves to accept the lowest or any tender.

By order,
W. J. Sturges,
Secretary.

Public Buildings, Smethwick,
March 5, 1896.

CITY OF LEEDS.
(Gas Department.)

TENDERS FOR DRY GAS-METERS.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of DRY GAS-METERS, to be delivered at their Meter-Stores, during a period of Twelve Months from receipt of order.
Each party tendering is required to send, on or before Monday, the 16th inst., two Sample Three-Light Meters (one of which is to be open for examination), addressed to the Gas-Meter Works, Dewsbury Road, Leeds.
Forms of Tender may be obtained on application to the undersigned at the Offices of the Gas Department, Municipal Buildings, Leeds.
Endorsed tenders, addressed to the Chairman of the Gas Committee at the latter address, will be received not later than Wednesday, the 18th inst.
The Committee do not bind themselves to accept the lowest or any tender.

R. H. Townsley,
General Superintendent.

WALLASEY URBAN DISTRICT COUNCIL.

GAS-WORKS EXTENSION.

TO ENGINEERS AND MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for—
(*a*) Four-Wheel Coupled LOCOMOTIVE.
(*b*) STATION METER.
Copies of the Specifications may be obtained on application to the Engineer, Mr. J. H. Crowther, at the Gas and Water Works, Great Float, near Birkenhead. A charge of £2 2s. will be made for copy of each Specification, to be returned on receipt of a *bonâ-fide* tender.
Sealed tenders on the form provided for the purpose, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Locomotive," or "Station Meter," as the case may be, to be delivered at my Office, as below, not later than Four o'clock in the afternoon on Monday, the 6th day of April, 1896. Each Contractor will be required to enter into a bond with approved Sureties for the due performance of the Contract.
The Council do not bind themselves to accept the lowest or any tender.

By order,
W. Danger,
Clerk to the Council.

Public Offices, Egremont, Cheshire,
March 6, 1896.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ASSEMBLY of Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate, E.C., on Thursday, the 2nd of April, 1896, at Twelve o'clock Noon precisely, pursuant to Act of Parliament.
The TRANSFER BOOKS in respect of the Ordinary Stock WILL BE CLOSED on the 18th of March, and RE-OPENED on the 9th of April, on which day the Dividends on this Stock will be payable.

By order,
I. A. Crookenden,
Secretary.

St. Helen's Place, E.C.,
March 4, 1896.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Thursday, the 2nd of April, 1896, at Twelve o'clock at noon.
To receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December, 1895;
To declare a Dividend;
And to elect Directors and an Auditor in the place of those retiring.
The STOCK TRANSFER BOOKS WILL BE CLOSED from the 20th of March inst. to the 2nd of April next, both days inclusive.

By order of the Board,
H. D. Ellis,
Secretary.

Offices, Stepney,
March 10, 1896.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Wednesday, the 25th inst., at half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.
Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 14th and RE-OPENED on the 26th inst.

By order of the Court of Directors,
Frederic Lane Linging,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 6, 1896.

COLNE VALLEY WATER COMPANY.

SALE BY TENDER OF ONE THOUSAND NEW ORDINARY SHARES OF £10 EACH.

Minimum Price, £13 Per Share.

NOTICE is Hereby Given, that it is the intention of the Directors of the above Company to SELL BY TENDER One Thousand New ORDINARY SHARES of £10 each.
Particulars, with Forms of Tender, can be obtained on application at the Company's Office; and Tenders must be sent in on or before the 18th of March, 1896.

By order,
Wm. Verini, Secretary.

Office: Bushey, Watford,
March 2, 1896.

BY ORDER OF THE DIRECTORS OF THE CROYDON COMMERCIAL GAS AND COKE CO.

ISSUE OF £5900 NEW CONSOLIDATED "B" STOCK.

HOOKER & WEBB will Sell by Auction, at the Greyhound Hotel, Croydon, on Thursday, the 12th of March, 1896, at Six o'clock precisely, in 76 Lots, £5900 CONSOLIDATED "B" STOCK of the Croydon Commercial Gas and Coke Company.
The Dividend paid on the "B" stock for some years has been at the rate of 11 per cent. per annum; and it is capable of further increase. The Sale therefore offers an unusually good opportunity for Safe Investment.
Particulars and Conditions of Sale can be obtained of Mr. W. J. Russell, the Secretary, at the Offices of the Company, Katharine Street, Croydon; Messrs. Blyth, Dutton, Hartley, and Blyth, Solicitors, 112, Gresham House, London, E.C.; at the Place of Sale; and of the Auctioneers, 4, High Street, Croydon.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.

He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.

Offices: 18, FINSBURY CIRCUS, E.C.

Second Portion of the Estate of the late William Halfhead, Esq.—Important Sale of Gas and Water Stocks and Shares.

Gaslight and Coke Company—£450 Stock ("A" and "K").
Commercial Gas Company—£520 Stock (Old and New, and Debenture).
Hornsey Gas Company—£1220 Stock ("C," "B," and Preference).
West Ham Gas Company—237 Shares and £700 Debenture Stock.
Tottenham and Edmonton Gas Company—£460 Stock ("A" and "B").
Lea Bridge Gas Company—15 Shares (Original).
Romford Gas Company—47 Shares (Original and "B").
West Kent Gas Company—44 Shares (Original and New).
Worthing Gas Company—£200 Stock and 10 New Shares.
Enfield Gas Company—£731 Stock (Preference and Debenture).
North Camp and Farnborough Gas Company—20 Shares.
Bournemouth Gas and Water Company—40 "B" Shares, £300 Debenture Bonds.
Barnet District Gas and Water Company—£150 Stock, 20 "D" Shares.
West Surrey Water Company—152 Ordinary and Preference Shares and £450 Debenture Stock.

All paying good Dividends and offering Investments of the highest character.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Wednesday, March 18, at Two o'clock precisely, in lots.

Particulars of Messrs. LEWIS AND SONS, Solicitors, 7, WILMINGTON SQUARE, W.C., and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C., and TOTTENHAM.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

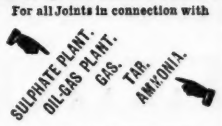
This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C

ESTABLISHED 1862. **NEW GAS PLANT CEMENT**

TRADE MARK.

For all Joints in connection with



SAMPLES ON APPLICATION.

SPECIAL PAINTS FOR GAS-WORKS.

Telegrams "Enamel." Nat. Tel. 1759.

John E. Williams & Co., *Victoria Paint Works,* **Manchester.**

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

NOTICE.

Whereas it has come to the knowledge of the INCANDESCENT GAS-LIGHT COMPANY, Limited, of Palmer Street, Westminster, that a Company called the Meteor Incandescent Gas-Light Company, Limited, a firm known as Putz and Co., and a Company known as the Evening Sunlight Incandescent Light Company or the New Incandescent Light Company, are selling, and are offering for sale, forms of Incandescent Gas-Lights called respectively the "Meteor," the "Champion," and the "Evening Sunlight,"

THIS IS TO GIVE NOTICE, THAT THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, will commence ACTIONS FOR INFRINGEMENTS OF THEIR PATENTS against all persons found dealing in any manner with the said "Meteor," "Champion," or "Evening Sunlight" Incandescent Gas-Lights, which are all constructed in Infringement of the Patent of the Incandescent Gas-Light Company, Limited.

The validity of the Company's Patent has been certified by the Hon. Mr. Justice Romer.

FAITHFULL & OWEN,
11, Victoria Street, S.W.
Solicitors for the Incandescent Gas-Light Company, Limited.

NOTICE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

"The Incandescent Gas-Light Company, Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo*, Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—

The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others*, the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.

(Signed) FAITHFULL & OWEN,
Solicitors for the Incandescent Gas Light Company, Limited.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WARNING.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

WHEREAS, it has been brought to the notice of the INCANDESCENT GAS-LIGHT COMPANY, LIMITED, THAT DIVERS FIRMS UPON THE CONTINENT OF EUROPE are Manufacturing Incandescent Gas-Mantles, and are sending the same into this Country, and are advertising for Agents to push the sale of these Mantles,

THIS IS TO GIVE NOTICE, THAT ALL SUCH MANTLES ARE INFRINGEMENTS OF THE COMPANY'S PATENT, and that the Company will take proceedings for Infringement against all persons purchasing or using any of such Incandescent Gas-Mantles. THE COMPANY OWN THE MASTER PATENTS in this Country for the manufacture of Incandescent Gas-Mantles, and the validity of such Patents has already been certified by the Honourable Mr. Justice Romer, and the Company will enforce their Patent Rights against all Infringers.

FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.
11, Victoria Street, Westminster.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an Action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

LOW MOOR BLACK BED

GAS COAL.

YIELD OF GAS PER TON - 10,375 CUBIC FEET.
ILLUMINATING POWER - 17·50 SPERM CANDLES.
COKE - - - - - - - - 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

Price 21s., Post Free,

PRECEDENTS IN
PRIVATE BILL LEGISLATION
AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.
Compiled by E. H. STEVENSON & E. K. BURSTAL.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

W. E. SANDER,
COMMISSION AGENT, BERLIN, 41, FRIEDRICH STR.

SPECIALITIES: Incandescent Lamp Burners and Mantles (with or without electric lighting from any distance, by button from the wall, etc.).

INCANDESCENT SPIRIT LAMPS.
Electro-technical Ware of all kinds.
IMPORT and EXPORT.

BOWENS' Ltd. Successors,
STOURBRIDGE.

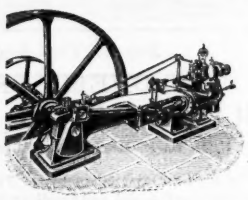
MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

STOURBRIDGE
RETORTS AND FIRE-BRICKS.
BEST QUALITY.
KING BROTHERS, STOURBRIDGE.
[See Illustrated Advertisement, March 3, p. 484.]

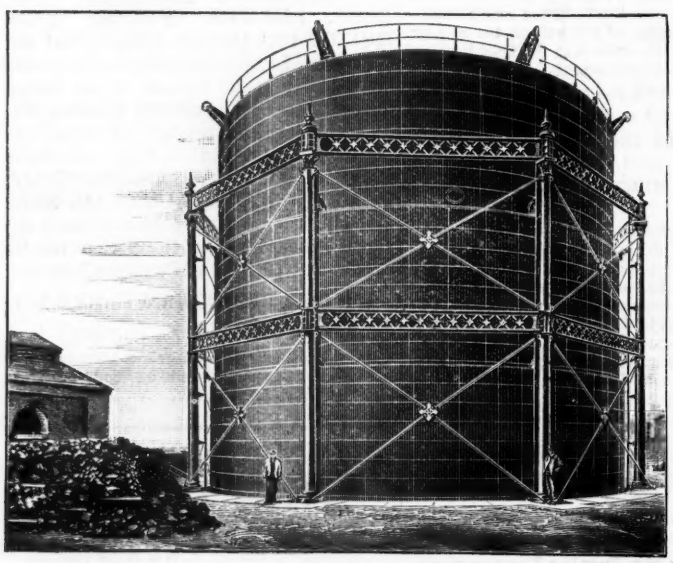
CALCIUM CARBIDE
FOR THE PRODUCTION OF ACETYLENE GAS
IN RETAIL OR WHOLESALE QUANTITIES.
For Prices apply to
HARRINGTON BROS., *Oliver's Yard, 53A, City Road,* LONDON, E.C.

OXIDE OF IRON.
NATURAL BOG ORE FROM OWN MINES.
Samples and Prices on application.
WM. H. MÜLLER & CO.,
81, PALMERSTON BUILDINGS, LONDON, E.C.
TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

JAMES MILNE & SON, LTD.,
GAS ENGINEERS,
MILTON HOUSE WORKS, EDINBURGH.
LONDON. — GLASGOW. — LEEDS.



R. DEMPSTER & SONS, Ltd.,
ROSE MOUNT GAS ENGINEERING WORKS,
ELLAND.



TELESCOPIC HOLDER CONVERTED BY US INTO A THREE-LIFT.

Gasholders of any size.

Tanks in Steel, Wrought or Cast Iron, or Brick.

SCRUBBERS & PURIFIERS.

Rotary and Reciprocating Exhausters.

Generator and Regenerator Furnaces and Retort Work of every description.

CONTRACTORS FOR EVERY DESCRIPTION OF
GAS PLANT AND CONSTRUCTIONAL IRONWORK.
ENQUIRIES SOLICITED.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . $13\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor $94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.
W. H. PARKINSON,
FITTER.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

COKE-BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

JUNKERS' CALORIMETER
SHOWS AT A GLANCE THE HEATING VALUE OF GAS.
NO BOMB. NO ANALYSIS.
See Illustrated Advertisement in the "JOURNAL" for March 3, p. 438.
Reduced Price £15 15s.
HERMANN KÜHNE,
25-35, New Broad Street, London, E.C.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
Ash . . . . . 2·73 „

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
12, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,
Brattell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

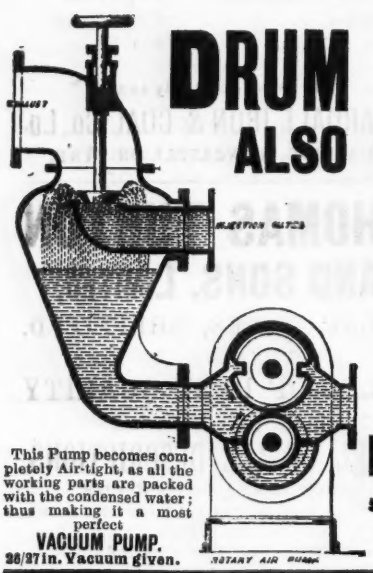
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD ST., E.C.

HUNTER'S
OXIDE OF IRON.
JAMES HUNTER, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.
This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.
Samples and Prices on application.
5, PRINCES STREET, PORT GLASGOW.
Telegrams: "HUNTER, PORT GLASGOW."
Established 1872.

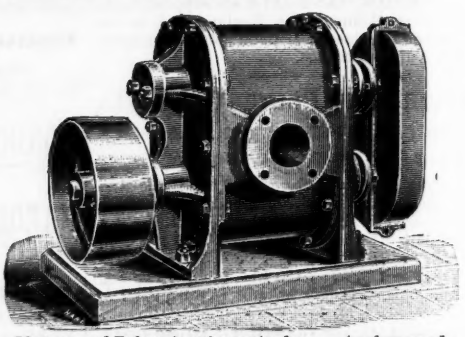
UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

"The Force of the Piston Pump with the Capacity of the Centrifugal combined."
JOHNSON'S PATENT
DRUM PUMP AND EXHAUSTER
ALSO VACUUM PUMP AND CONDENSER.



No Priming, Valves, or Frictional Working Parts.

The Pump of the future for quickly and economically moving large Bodies of Water, Semi-fluid, &c.

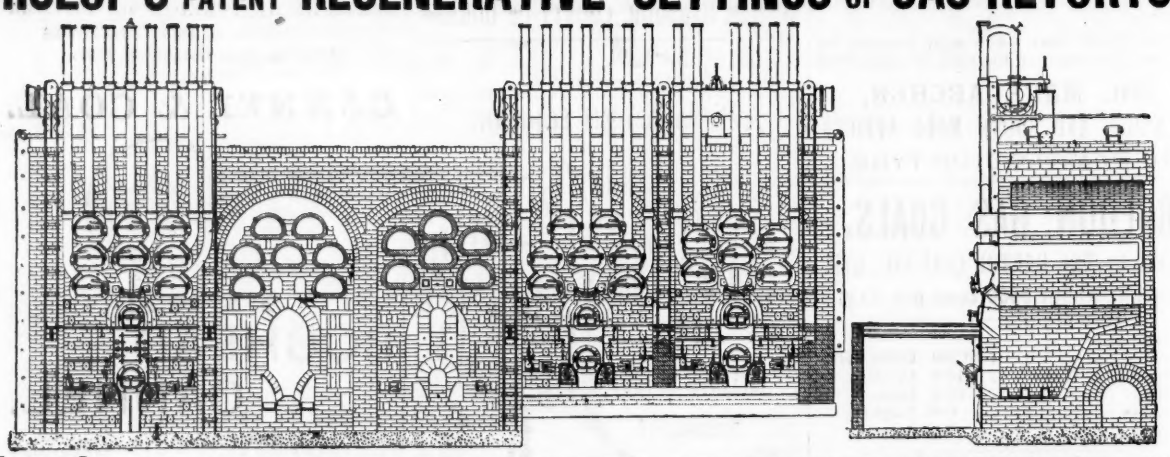


This Pump becomes completely Air-tight, as all the working parts are packed with the condensed water; thus making it a most perfect
VACUUM PUMP.
28/27in. Vacuum given.

DRUM ENGINEERING Co.
55, ATHOL ROAD,
BRADFORD.

Blowers and Exhausters guaranteed, even at a slow speed, to give a working pressure of 3 lbs. and upwards, and this without losing power by creating frictional Heat.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 28 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
Further Information and Pamphlets from Principal Agent.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Liverpool	2,500,000 Cub. Ft.
Belfast	1,700,000 ,,	Tottenham	600,000 ,,
Glasgow	300,000 ,,	Brighton	1,250,000 ,,
Brussels	700,000 ,,	Bath	1,000,000 ,,
Santiago	400,000 ,,	New York	1,000,000 ,,
Swansea	700,000 ,,	Newburgh, N.Y.	350,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Preston	1,500,000 ,,	Brussels (Second Contract)	700,000 ,,
Southport	750,000 ,,	St. Joseph, Mo.	750,000 ,,
Tottenham (Second Contract)	750,000 ,,	Holyoke, Mass.	500,000 ,,

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W. Telegrams: "EPISTOLARY, LONDON." *United States Office, 64, Broadway, New York.*

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Proprietors of

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ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
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Mantles are sold in any quantity without restriction for use of particular kinds, and are very durable.

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RICH IN ILLUMINATING POWER AND YIELD OF GAS.
ABOVE THE AVERAGE IN WEIGHT AND QUALITY OF COKE.
MAINTAINS A HIGH STANDARD IN RESIDUALS.

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GASEOUS FIRING A SPECIALTY.

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FURNACES.
FOR ENGLAND, WALES & ABROAD.
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Telephone No. 43.
HALIFAX EXCHANGE.

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PATENT COMBINED
SEAL-REGULATING
FLUSH-VALVE.

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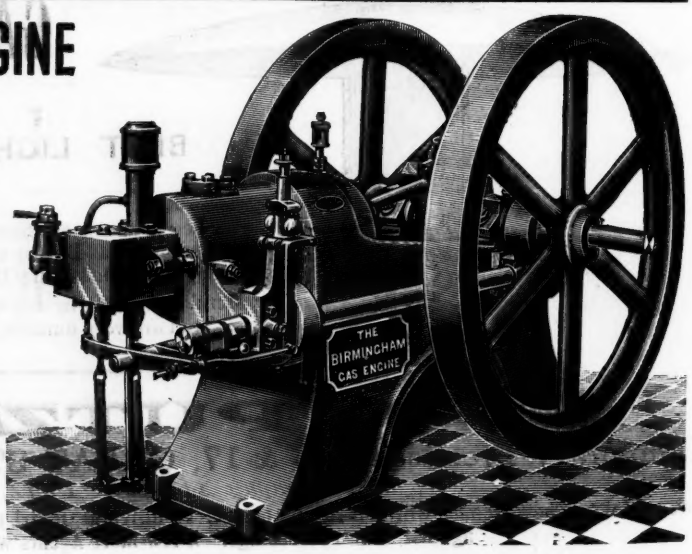
60. QUEEN VICTORIA ST. E.C.

THE BIRMINGHAM GAS-ENGINE

"OTTO" CYCLE.

A thoroughly reliable Engine for Commercial or Electric Lighting Purposes. Simple, Strong, Interchangeable.

Adopted by the Corporation of Birmingham Gas Department for Driving the Conveyors at their Swan Village Works.



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Engineers and Founders,
FAZELEY STREET, BIRMINGHAM.
LONDON REPRESENTATIVE: Mr. SAM PUPLETT, M.I.M.E., 47, Albany Buildings, Victoria Street, Westminster.

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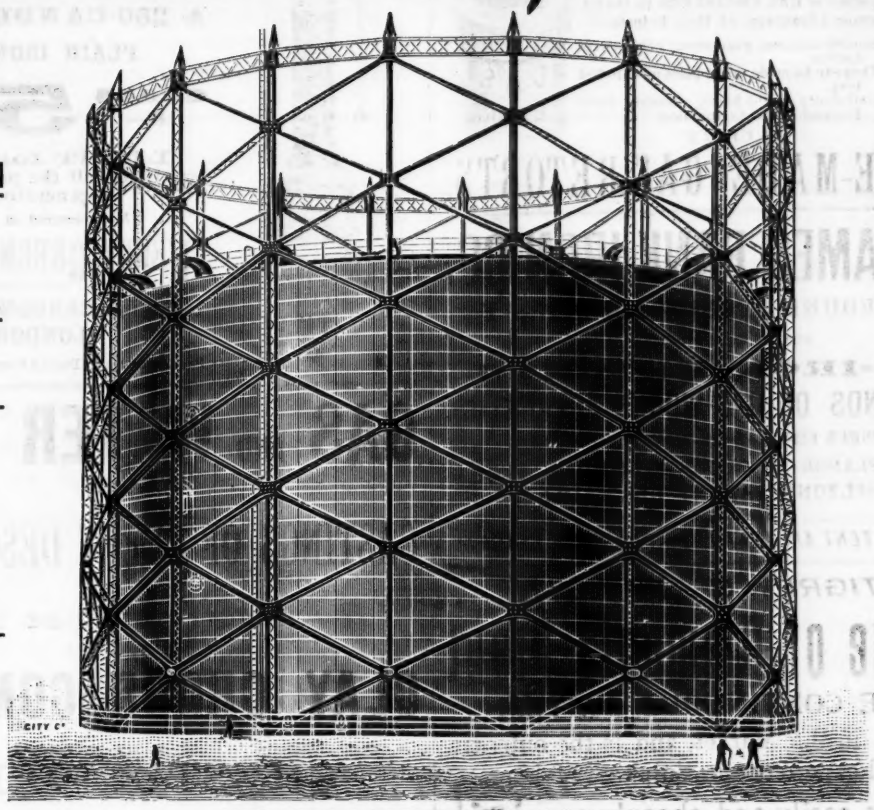
BEST POSSIBLE DISPOSITION OF MATERIALS.

SAFE.

CHEAP.



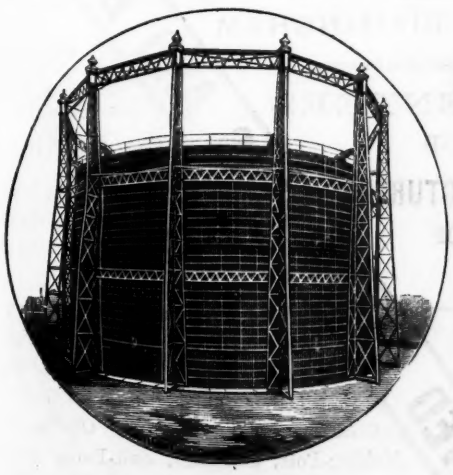
SAVING IN COST OF TANK AS No Piers ARE Required.

CUTLER'S PATENT GUIDE-FRAMING.

GASHOLDERS OF EVERY DESCRIPTION.

THE FOLLOWING ARE A FEW EXAMPLES OF LARGE HOLDERS RECENTLY ERECTED—

Kensal Green .	3-lift	247 by 55	Nottingham (2)	2-lift	180 by 38	Amsterdam (2) .	3-lift	150 by 25
Bethnal Green .	3-lift	197 „ 50	Do. . .	2-lift	160 „ 37	West Ham . . .	2-lift	150 „ 36
Birmingham (2)	3-lift	236 „ 50	Copenhagen. .	3-lift	175 „ 30	Derby	2-lift	140 „ 26
Vienna . . .	3-lift	204 „ 41	Hull	3-lift	160 „ 37	Rochdale. . . .	4-lift	150 „ 34
Dublin . . .	2-lift	201 „ 40	Portsea . . .	3-lift	158 „ 30	Tottenham . . .	3-lift	150 „ 32
Berlin. . . .	3-lift	181 „ 35	Hanover . . .	3-lift	154 „ 38	Sunderland . . .	3-lift	150 „ 32

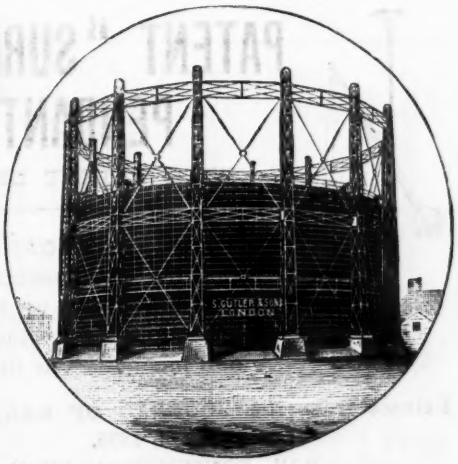


STEEL TANKS FOR GASHOLDERS.

CUTLER'S PATENT

Freezing Preventer

SHOULD BE FITTED TO ALL GASHOLDER CUPS.



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Designs and Estimates upon Application.

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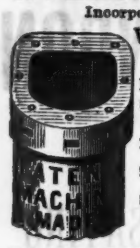
Incorporated with the Leeds Fire-Clay Company, Ltd.,

WORTLEY FIRE-CLAY WORKS,

Near LEEDS,



Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

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THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS.

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of LYON'S 'PATENT' GAS MAIN SYPHONS.

AGENTS FOR

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ON THE CONTINUOUS SYSTEM

Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.

Old Systems easily and cheaply converted.

ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.

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MIDDLESBROUGH-ON-TEES.

BEST & LLOYD

MAKERS OF BIRMINGHAM.

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PATENT "SURPRISE" PENDANT,

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The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

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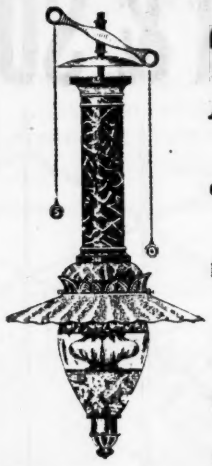
"IN CONJUNCTION WITH

THE INCANDESCENT GAS-LIGHT,

it quite **supersedes** the familiar three-light pendant. We are able to bear witness to the **convenience** of the New Pendant."

The Climax of Regenerative Gas Lighting!!



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A 280-CANDLE POWER PLAIN IRON LAMP,

CLASS A— **55/-**

LIGHT for LIGHT less than half the price of any other Regenerative Lamp.

Manufactured in England.

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PARTICULARS AND PRICES FREE. AGENTS WANTED.

GAS AND WATER PIPES

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CASTINGS OF EVERY DESCRIPTION.

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IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

Drawings, Specifications, and Estimates supplied.

HARPER & MOORES,
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BEST FIRE-BRICKS, GAS-RETORTS,

LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

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ESTABLISHED 1826.

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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

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ENGINEERS,
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The Apparatus has been supplied to the following Firms—

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NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
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PATENT MECHANICAL CONDENSER.

Over 292,000,000 Cubic Feet of Gas per Day is passing through about 550 of these Machines.

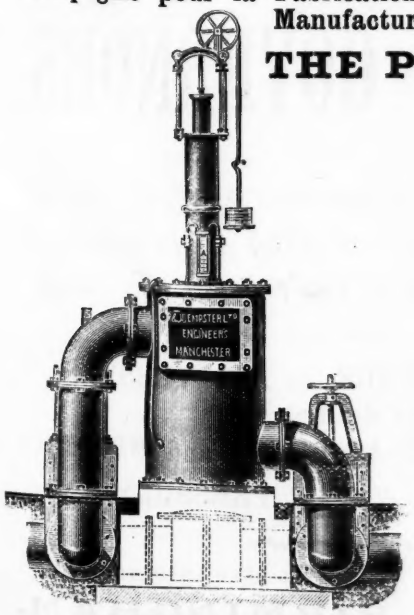
Messrs. R. & J. DEMPSTER, Limited,

HAVE PLEASURE IN ANNOUNCING THAT THEY HAVE MADE ARRANGEMENTS WITH THE

Compagnie pour la Fabrication des Compteurs et Materiel d'Usines a Gaz, of Paris, to Manufacture and Sell in this Country and the Colonies,

THE PELOUZE & AUDOUIN CONDENSER,

According to P. AUDOUIN'S LATEST PATENTS.



FRONT ELEVATION.

This Apparatus is in very general use in most of the Gas-Works on the Continent and in America; over **550** being in use in different parts of the World for condensing and arresting all Tar Particles and Vapours from the Gases from Coal, Oil, and Wood.

The large number in use is sufficient proof of its utility. By the almost complete elimination of Tar, which is effected to the extent of 99·7 per cent., it facilitates Purification in the Purifiers, by preventing the clogging or obstruction of the Purifying Materials, which, in consequence, last much longer; thus effecting a Saving both in Materials and Labour.

So effective is this Apparatus that a piece of white paper placed over a Test-Tap on the Inlet of the Machine is immediately covered with Tar, whilst on the Outlet the white paper remains perfectly clean.

The Machines are made in the following sizes, for Works producing per 24 hours—

	Cubic Feet.		Cubic Feet.
0	35,000	5	500,000
1	70,000	6	700,000
2	140,000	7	1,240,000
3	210,000	8	1,750,000
4	350,000	For larger Makes, two Machines are recommended.	

For Prices and further Particulars, apply to the Sole Makers—

Telegraphic Address: "SCRUBBER, MANCHESTER." **R. & J. Dempster, Ld., Gas Plant Works, Newton Heath, Manchester.** Nat. Telephone Nos. 2296 & 54.

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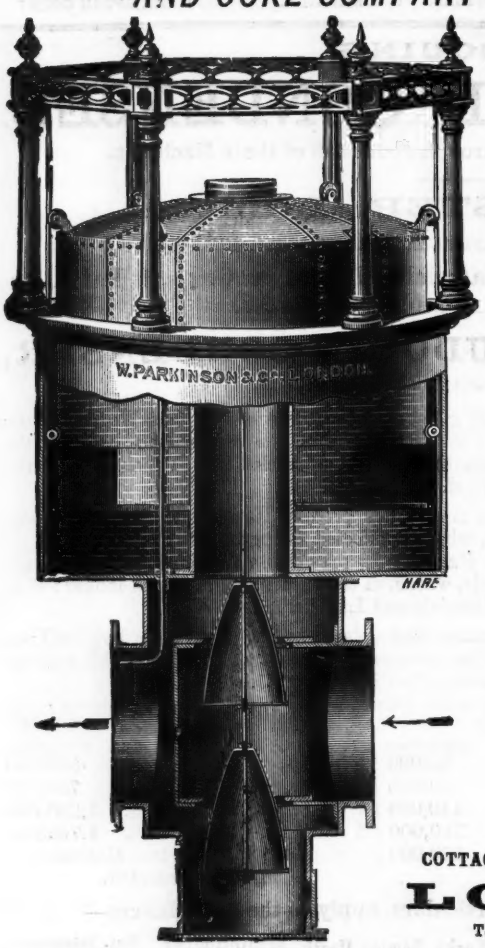
All the Meters (which number 14) at the Beckton Station of THE GASLIGHT AND COKE COMPANY have been erected by the above Firm.



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A very large number are now at work; and all Engineers who have adopted them speak in unqualified terms of their great efficiency.

COUNTERBALANCE or AIR VESSEL, as desired.
TWO, FOUR, or SIX COLUMNS and GIRDERS.
WEIGHTS or WATER PRESSURE.

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[See also Advt. p. 502.

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